

PROVINCE OF ALBERTA

Provinces of Africa

DEPARTMENT OF AGRICULTURE

FIELD CROPS BRANCH

Department of Agriculture

ALBERTA'S WEED PROBLEM

~~word problem~~ BULLETIN No. 3

Bulletin No 2
Published by direction of the
HON. GEORGE HOADLEY, Minister of Agriculture



EDMONTON:

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PROVINCE OF ALBERTA

DEPARTMENT OF AGRICULTURE

FIELD CROPS BRANCH

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Crop

Elva Tennes

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Gwen

Denner Star

WEED PROBLEM

Bulletin no 3
BULLETIN No. 3

Problem

Spanish wine

Eclipse

No 3

Noxious Weeds Act of Alberta; Organized Effort to Control
Weeds; General Principles of Eradication; Description,
Dissemination, Eradication and Control of
a Few of Alberta's Most Dangerous Weeds

By W. J. STEPHEN

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OF AGRICULTURE

Department

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P R E F A C E

Bulletin No. 3 is intended briefly to outline the efforts which are being put forth in the Province to combat noxious weeds. A brief description of a few of the most troublesome noxious weeds, together with methods of control and eradication, is also given. All control methods included herein are based on actual experiments conducted in the Province by farmers and scientific agriculturists.

THE NOXIOUS WEEDS ACT

(Assented to March 20, 1929.)

HIS MAJESTY, by and with the advice and consent of the Legislative Assembly of the Province of Alberta, enacts as follows:

SHORT TITLE.

1. This Act may be cited as "*The Noxious Weeds Act, 1929.*"

INTERPRETATION.

2. In this Act, unless the context otherwise requires—

- (a) "Corporation" shall mean any city, town, village or municipal district;
- (b) "Department" shall mean the Department of Agriculture;
- (c) "Destroy" shall mean to do that which will cause growth or germination to cease permanently;
- (d) "Earthwork" shall mean any dump or heap of earth, or place from which earth has been removed;
- (e) "Inspector" shall mean any inspector appointed under the provisions of this Act, or of any other Act, to carry out and enforce the provisions of this Act;
- (f) "Minister" shall mean the Minister of Agriculture;
- (g) "Class A noxious weeds" shall include perennial sow thistle (*Sonchus arvensis*, L.); "Class B noxious weeds" shall include Canada thistle (*Cnicus arvensis*), blue lettuce (*Lactuca pulchella*, D.C.), all members of the mustard family, false flax (*Camelina sativa*), shepherd's purse (*Capsella bursa-pastoris*), red root (*amarantus retroflexus*), stink weed (*Thlaspi arvense*), Russian thistle (*Salsola kali v. Tragus*), ragweed (*Ambrosia trifida*), wild oats (*Avena fatua* and *Avena strigosa*), Russian pigweed (*Axyres amaranthoides*), blue bur (*Echinospermum lappula*), tumble weed (*Amarantus albus*), purple cockle, cockle bur (*Xanthium strumarium*, L.), common barberry (*Berberis vulgaris*), toad flax (*Linaria vulgaris*, Hill), and black-headed sunflower (*Helianthus scaberrimus* El.);
- (h) "Occupant" shall mean a person occupying or having the right to occupy any land;
- (i) "Owner" shall include every person who has any estate or interest in land or grain, or who has any right to be vested with such estate or interest; and

for the purposes of this Act, and with respect to all lands within the boundaries of a city, town, village or municipal district, shall include the corporation of such city, town, village or municipal district;

- (j) "Screenings" shall mean material removed from grain through cleaning to bring it up to the standards defined for grades under *The Canada Grain Act*;
- (k) "Thresher" shall mean any person in possession or charge of a threshing machine or combine;
- (l) "Weed seeds" shall mean seeds produced from any of the weeds defined as Class A or Class B weeds.

INSPECTORS AND OTHER OFFICERS.

3.—(1) The Minister may from time to time appoint such inspectors and other officers as may be required to carry out the provisions of this Act, fix their remuneration and define their duties.

(2) In the event of any corporation failing to appoint sufficient inspectors to carry out and enforce the provisions of this Act, the Minister may appoint such inspectors and their salaries and expenses shall be paid out of the funds of the corporation, upon receipt of a precept therefor from the Minister.

(3) The Minister may dismiss any weed inspector appointed by a corporation if, in his opinion, the said inspector is incompetent or remiss in the discharge of his duties.

(4) The Minister may appoint weed inspectors in improvement districts, and the salaries and expenses of such inspectors shall be paid by the Minister of Public Works out of the funds of the districts concerned.

DUTY OF OWNER OR OCCUPANT OF LAND.

4.—(1) Subject to the provisions of the next following subsection, every owner or occupant shall destroy all noxious weeds or weed seeds on the lands he owns, occupies or has a right to occupy.

(2) In the case of earthworks, ditches or easements constructed by or under the control of an irrigation district, the irrigation district or irrigation company shall be deemed to be the owner and occupant of such earthwork, ditch or easement, within the meaning of this Act, and shall be subject to all the liabilities of an owner or an occupant.

Provided, however, that where the person actually in occupation of the land on which there is any such earthwork, ditch or easement has purchased such land from an irrigation district or company and has agreed with it to fulfil the obligations imposed upon the district or company

by this section, such district or company shall not during the period of such actual occupation be deemed to be the owner or occupant of such earthwork, ditch or easement.

(3) Every owner or occupant in an improvement district, shall destroy all noxious weeds or weed seeds on the area between the boundaries of his land and the centre line of all contiguous roads and road allowances, and for the purposes of this Act, shall be deemed to be the owner or occupant of such area.

(4) Every corporation shall destroy all noxious weeds or weed seeds on the roads and road allowances within the area controlled by it, and for the purposes of this Act shall be deemed to be the owner or occupant of such roads and road allowances.

(5) Every owner or occupant failing to comply with the provisions of this section shall be liable upon summary conviction to a penalty of not less than five dollars and costs, and not more than fifty dollars and costs.

(6) White clover, timothy or western rye grass or a mixture thereof, shall be sown and cultivated by railway and irrigation companies on all earthworks made by them.

DESTRUCTION OF WEEDS.

5.—(1) Any inspector may enter upon any land to inspect it or any building, other than a private dwelling-house, or equipment thereon for noxious weeds or weed seeds, and any person obstructing him in the discharge of his duty shall be guilty of an offence and liable on summary conviction to a penalty not exceeding twenty-five dollars and costs.

(2) Any inspector finding Class A noxious weeds or weed seeds upon any land or in or upon any equipment or building thereon shall direct any owner or occupant of such land to proceed forthwith to destroy the same, and in the event of the said owner or occupant failing to comply with any such direction within a stated time from the giving thereof, the inspector shall at once proceed to cause the weeds or weed seeds to be destroyed by any means which he may deem advisable.

(3) Any inspector finding Class B noxious weeds or weed seeds in any grain or hay crop may notify the owner—

- (a) to pull by hand any or all of the noxious weed plants and to destroy the same in such manner as the inspector may advise, or cut and burn or plow under such crop or any part thereof, within a stated time; or
- (b) to burn the straw or screenings or both from any crop or part thereof, upon notice by an inspector; or
- (c) to cause to be fed on the ground where it grows any feed produced thereon in such manner as the

inspector may define, and to prohibit the owner of any feed or other crop from threshing the same if it contains noxious weeds or weed seeds that might menace adjacent areas.

6. Any inspector finding Class B noxious weeds or weed seeds on occupied lands shall notify the owner or occupant thereof to destroy such weeds or weed seeds within the time set out in such notice.

7. Any inspector finding Class B noxious weeds or weed seeds on unoccupied lands shall notify the owner either personally or by registered letter, addressed to his last known address, if any, to destroy such weeds or weed seeds within the time set out in such notice.

8. Any inspector finding Class B noxious weeds or weed seeds on any railway fire-guard, right-of-way or any other earthwork, or on any unoccupied lands owned by or forming part of the land grant of any railway shall notify the roadmaster or foreman of that section, or the nearest station agent, either personally or by registered letter, to destroy such weeds or weed seeds within the time set out in such notice.

9. Any inspector finding Class B noxious weeds or weed seeds on occupied or on unoccupied land within the boundaries of a city, town or village shall notify the mayor or secretary of such corporation, by registered letter, to destroy such weeds or weed seeds within the time set out in such notice.

10. Any inspector finding Class B noxious weeds or weed seeds in or upon any earthwork, ditch or easement of which an irrigation company is deemed to be the owner or occupant, as hereinbefore provided, shall notify the manager, superintendent or ditch rider of such company, either personally or by registered letter, to destroy such weeds or weed seeds within the time set out in such notice.

11. Any person or corporation to whom notice has been duly given under any of the preceding sections, who neglects to carry out the directions contained therein, shall be guilty of an offence, and, on summary conviction thereof, shall be liable to a penalty of not less than five dollars and costs, and not more than fifty dollars and costs.

12. In case Class B noxious weeds or weed seeds are not destroyed on any land pursuant to any notice given by an inspector under this Act, or in case the name or address of the owner of such land is unknown, the inspector or any person or persons directed by him may forthwith enter upon the land with the necessary teams and implements and destroy such weeds or weed seeds and the portion of the crop (if any) infested with weeds or weed seeds, in such manner as the inspector may see fit.

13. No inspector appointed under the provisions of this Act or of any other Act shall give any order for the destruction of any or all of a crop under any provision of this Act until he has notified the Field Crops Commissioner, and obtained his consent.

14.—(1) In the event of any person thinking he has been aggrieved by any order for the destruction of noxious weeds or weed seeds, given by an inspector of a corporation, he may appeal to such corporation, who shall duly hear the said appeal, either as a whole or by means of delegation to a committee.

(2) Any such person may, if dissatisfied with the decision of the corporation, further appeal to the Field Crops Commissioner, whose decision in the matter shall be final.

15.—(1) The amounts expended in the work performed under sections 5 and 12 may be recovered from the owner or occupant of the land by action in the name of the Attorney General or the inspector or by distress by the inspector or his agents of any chattels on the land.

(2) Any such amount which has not been recovered from the owner or occupant before the first day of January next following its expenditure, shall be added to and form part of the improvement or municipal taxes upon such lands, and it shall have the same effect on the land as if it were an original tax, and may be recovered by any of the methods available for the recovery of such taxes; and the amount so recovered shall be transmitted to the Provincial Treasurer and form part of the general revenue fund of the Province:

Provided that no sum in excess of one hundred and sixty dollars shall be charged in any one year against any one quarter section of land for the destruction of Class B noxious weeds or weed seeds. This does not apply to expenditures incurred for the destruction of noxious weeds or weed seeds within a city, town or village.

(3) Immediately after the said first day of January the Department shall send to each corporation concerned, or the Deputy Minister of Municipal Affairs, as the case may be, a detailed statement of the parcels of land on which any money has been expended under the provisions of the said sections, and of the amounts expended in respect of each.

(4) Any such amount expended for weed control or eradication within the boundaries of any incorporated city, town or village, by the Minister or his inspectors, shall be recoverable by warrant and distress against the goods and chattels of such corporation.

(5) A certificate to be issued by the Minister to the effect that the amount named therein has been expended, during any period, for the destruction of noxious weeds or weed seeds within such corporation, shall be *prima facie* evidence that the amount named has been expended.

SALE OR DISPOSAL OF GRAIN, ETC., CONTAINING WEED SEEDS.

16.—(1) Save as is hereinafter provided by this Act, no person shall buy or sell, or keep for sale or offer to buy or sell or remove from any grain elevator, mill or warehouse, any grain screenings which contain more than three per centum by weight of noxious weed seeds, capable of passing through a one-fourteenth inch perforated zinc screen, or more than one per centum by weight of mustard seed, which grain screenings are hereinafter referred to as Grade B screenings.

(2) All screenings other than Grade B screenings shall be known as Grade A screenings, and may be bought or sold or removed from any grain elevator, mill or warehouse for the purpose of feeding the same to live stock, if the same are contained in closely woven and securely tied sacks, but if the screenings are to be fed to live stock, they must be fed within properly constructed feed yards, which shall be subject to inspection by weed inspectors.

(3) Grade B screenings may be bought, sold or removed from any grain elevator, mill or warehouse by a dealer or other person, provided that such dealer or other person holds a permit from the Minister and subject to such conditions as may be set out in the permit.

(4) The said permit shall be issued in duplicate, and both copies of the permit shall be delivered by the purchaser to the manager of any grain elevator, mill or warehouse, dealer or other person from whom a purchase is made, and one of the copies shall be forwarded by the latter to the Minister within thirty days of the purchase.

(5) All Grade B screenings must be kept in tightly constructed buildings by every such manager, dealer or other person holding a permit, until they are delivered for the purpose of feeding.

(6) All Grade B screenings not so kept shall be burned by the manager, dealer or other person in whose possession they are, in such manner as to prevent their being scattered by the wind, live stock or any other agency.

(7) The Minister may, at his discretion, prescribe different forms of permit, and the conditions upon and times for which permits are to be issued.

(8) Lists of the persons to whom screenings are sold shall be furnished monthly to the Minister by the managers of grain elevators, mills or warehouses, at the same time stating the class of screenings sold in each case and the quantities.

(9) For the purposes of this section, seeds of lamb's quarters (*Chenopodium album*) shall be considered noxious weed seeds:

Provided that this section shall not apply to the removal by a farmer, from a grain elevator, mill or warehouse, of screenings from grain produced upon his farm.

17. No person shall place outside any mill, elevator or grain warehouse, except in a securely constructed building, shed or covered bin, any matter containing the seeds of noxious weeds without first having destroyed the germinating powers of such seeds.

18.—Every thresher who takes or causes to be taken any machine, wagons, and racks or any of them over or across any land forming part of an occupied or cultivated farm, without having first obtained the permission of the occupier thereof, shall be guilty of an offence punishable on summary conviction by a fine of not less than twenty-five dollars and costs, and not more than one hundred dollars and costs.

CLEANING OF THRESHING MACHINES AND GRAIN.

19. Every thresher shall clean his machine, both inside and out, and all his wagons and racks immediately after threshing, and before removing any such article to another farm.

20.—(1) Every thresher shall clean the grain threshed by him, and when delivered to the owner it shall contain not more than one hundred seeds of noxious weeds other than wild oats, to every thousand of grain, and all screenings containing seeds of noxious weeds shall either be destroyed by the owner within five days after the grain is threshed or be stored in a granary or other tightly sealed building, or be removed in accordance with the provisions of subsection (2).

(2) If it is desired to move the screenings from one part of the farm to another, it shall be sufficient to remove the same in wheat-tight or flax-tight wagon boxes, but if the screenings are to be removed from the farm they must be removed in closely woven and securely tied sacks.

21. Every thresher shall display in a prominent place upon his machine a card containing this and the two next preceding sections, which card shall be furnished free upon application to the Department.

22. No person shall move, or cause to be moved, any settlers' effects, to any point in the Province until all noxious weed seeds adhering to and being in or upon the same (if any), have been carefully removed, and a statutory declaration to the effect that this section has been complied with, has been forwarded to the Minister.

23. No person shall move or cause to be moved any machinery, other than a threshing machine or combine, across or upon any public highway until the noxious weed seeds adhering to, or being in or upon the same (if any), have been carefully removed.

24. No person shall ship into the Province any hay or green sheaves without the consent in writing of the Field Crops Commissioner.

PENALTIES.

25. Every inspector or other officer who neglects to perform any duty placed upon him by this Act shall in respect of each instance of neglect be guilty of an offence, and liable on summary conviction thereof to a penalty not exceeding twenty-five dollars and costs.

26. Violation of any provision of this Act for which no penalty is provided shall be an offence, and the offender shall on summary conviction thereof be liable to a penalty of not less than five dollars and costs, and not more than fifty dollars and costs.

27. The Minister may, with the approval of the Lieutenant Governor in Council, appoint an advisory board consisting of such persons as may from time to time be deemed proper, whose duty shall be to confer with and advise the Minister on any matter or thing relating to the administration of this Act and the problem of weed eradication as and when the Minister may require, and whose remuneration shall be such as may be provided by the Lieutenant Governor in Council.

28. *The Noxious Weeds Act*, being chapter 63 of the Revised Statutes of Alberta, 1922, is hereby repealed.

ORGANIZATION

A brief outline of the organized effort that is being put forth in the Province to combat weeds may serve as an awakening to those who have not previously considered the weed menace, and at the same time stimulate to greater activity those who have not given it the consideration it deserves.

To successfully combat weeds requires the fullest co-operation of each and every person in the Province. Everyone should learn to recognize the weeds on the noxious weeds list at their various stages of growth.

Having learned to recognize the noxious weeds it is then imperative to know their habits of growth, how they are disseminated, and how they may be controlled and eradicated.

(A) THE GOVERNMENT

An Advisory Weed Board named by the Minister of Agriculture gives valuable advice from time to time to the Department in working out its weed policy. The personnel of the present Weed Board consists of the following: Messrs. H. A. Craig, Deputy Minister of Agriculture, Chairman; Clyde C. Gillies, Strathcona; George Bennett, Mannville; Don H. Bark, Brooks; H. E. G. H. Scholefield, Crossfield; Frank Reed, Experimental Station, Lacombe; H. W. Bright, Macleod; and W. J. Stephen, Secretary.

The Department of Agriculture annually divides the Province into districts and in each district a Field Supervisor is located. The Supervisors' duties are numerous, and their territories are of considerable extent. Each one has a district headquarters; and can be reached, in a few days at most, by letter or telephone.

The Supervisors attempt to make a weed survey of their district and to know the location of the most dangerous weeds. They solicit the co-operation of municipal councils, municipal weed inspectors, towns, cities, railway authorities, irrigation companies, schools, agricultural societies, U.F.A. locals, other organizations not mentioned, and private individuals. They direct experimental work with farmers on weed control. The results of a number of their experiments, while not absolutely conclusive, are contained in this bulletin. All Field Supervisors report that they receive the heartiest co-operation. Seldom is it found necessary to enforce the provisions of The Noxious Weeds Act.

Meetings are held frequently to discuss weeds and other phases of agriculture. Moving pictures relative to weed identification, and systems of farming that will control and eradicate weeds, have been prepared by the Motion Picture Branch of the Department of Agriculture and the Field Crops Branch. These pictures are frequently shown, and prove instructive and entertaining.

Noxious Weed Posters have been prepared and are available, free of charge, from the Field Crops Branch. These colored posters should be conspicuously displayed in every school house, community hall, and other places of meeting. They give an exact representation of the weed described, together with suggested methods of eradication.

Farmers, councillors, weed inspectors, and others are invited to get in communication with the nearest Field Supervisor, or write to the Field Crops Branch, relative to weed identification, weed control, or weed legislation.

(B) MUNICIPAL COUNCILS

Municipal Councils are respectfully reminded of Section 139 (1) of The Municipal Districts Act, which in effect gives Municipal Councils the power to appoint such weed inspectors as are required to carry out and enforce the provisions of The Noxious Weeds Act within their Municipal Districts. Every inspector so appointed has his powers and duties clearly defined in the Act.

Councils are urged to appoint their weed inspectors early in the season. It is preferable to appoint by the year, although the inspector may be required to work only a short period at a time. By so doing, there is legal authorization at all times for action when necessary.

Councils would be well advised to hold weed meetings in each division several times during the year. Government Field Supervisors will assist at these meetings during the summer, if desired. They are educational, and tend to stimulate interest and co-operation on the part of all the farmers of the district.

The secret of successful weed control is EDUCATION AND CO-OPERATION. Legal proceedings should be the last resort. Those in charge of weed work, however, should make it clearly understood that the weed laws of the Province must be respected and enforced if necessary.

(C) MUNICIPAL WEED INSPECTORS

Municipal Weed Inspectors should have neither friends nor enemies. They should be men of sound judgment and good practical knowledge. Their objective should be the building up of a strong community spirit, aiming to keep the land clean and at the same time make farming profitable. Every inspector should make a weed survey of his district, and at all times be prepared to give practical advice to those needing it.

At the expiration of their terms of office, and at least once each year in the autumn, inspectors should leave with their municipal secretaries a detailed statement dealing with work accomplished, work commenced, their weed survey, recommendations for eradication of weeds, and suggestions for the year following.

Municipal Weed Inspectors would be well advised to consult frequently with their nearest Field Supervisor, who may be able to render much needed assistance.

(D) TOWNS AND CITIES

Practically all the towns and cities of the Province are showing a reasonable amount of co-operation, and doing considerable to cope with the weed menace. However, in many places there is yet a great deal to be done. Unless the weeds in these centres are kept from drifting and blowing to adjoining areas, we shall always have trouble keeping the farms clean. If the councils could obtain the co-operation of all citizens, weeds would soon disappear. It is the duty of every resident in our towns and cities to do everything in his power to stamp out, and keep stamped out, all noxious weeds. By so doing, much will be done to improve agricultural conditions.

All councils should annually appropriate funds for weed eradication on their vacant lands, and appoint weed inspectors to compel citizens who are negligent in their duty to destroy the weeds on the areas they occupy and have a right to occupy.

(E) RAILROAD AND IRRIGATION COMPANIES

According to The Noxious Weeds Act, railroad and irrigation companies have certain obligations to carry out regarding the destruction of noxious weeds. It is gratifying to note the effort that is being put forth by these companies to comply with the Act. There is still much to be done. Weed Inspectors and others interested in weed control should at once notify the Road Master, Station Agent, or Section Foreman of the presence of any noxious weeds that have been overlooked on railway property. The Manager, Superintendent, or Ditch Rider of any irrigation company, or the owner or controller of any ditch or lateral ditch, should be promptly advised of the presence of noxious weeds that have escaped attention.

(F) SCHOOLS AND LOCAL ORGANIZATIONS

Children in both public and high schools should be taught to recognize the noxious weeds during their various stages of growth. They should also be taught how to control and eradicate them. Children grow up with this information, and in later life many of them will put their knowledge into practice.

In many districts local organizations, such as Agricultural Societies and U.F.A. Locals, have done much to bring before the people the seriousness of the weed menace. This continued co-operation is solicited.

THE DUTY OF THE FARMER

There are two classes of farms:

- (a) The clean farm.
- (b) The farm polluted with weeds.

The farmer with the clean farm should aim to prevent weeds from coming in.

The man with the weedy farm should prevent weeds from spreading and he should put forth his best endeavors to clean his land.

To intelligently cope with the weed menace, every farmer must be able to—

- (a) Identify the noxious weeds.
- (b) Know how they spread.
- (c) Know their habits of growth.
- (d) Know how to control and eradicate them.

HOW WEEDS SPREAD

(a) *Man* himself often brings in weed seeds in seed, feed, packing material, machinery, and livestock.

Sowing grain that is infested with weed seeds is a common practice. All seed should be thoroughly cleaned before seeding. If unable to rid it of weeds, new clean seed should be purchased.

Settlers, when moving from one district to another, should exercise care to thoroughly clean off all machinery and other effects, and not ship hay or other feed that contains foul seeds. Many clean districts have been polluted in this way. Wire fencing, when taken down for shipment to other districts, should be freed from weeds that cling to it. This may be done by means of an oil torch.

The purchase of screenings, and the careless handling of them, has scattered weeds along the highways and on to clean fields. Prospective purchasers should read carefully Sections 16, 17, and 18 of The Noxious Weeds Act.

Threshing machines, stock wagons, and farm machinery spread weeds from one farm to another.

Ranchers, railway contractors, and road gangs have been responsible for the importation of weed seeds in feed, such as hay and oats which have been brought in from other countries and provinces.

(b) *Animals*, including both domestic and wild, with the exception of sheep, in the processes of mastication and digestion have not the power to destroy the germination of many of the weed seeds; and so they are passed through the digestive organs and spread about the fields. In cases where it is found necessary to feed grain containing weed seeds, the stock should be kept in enclosures, and the manure should be thoroughly rotted before being spread on the land. In many cases it is wise to burn the manure.

Stock should not be allowed to eat the screenings left by threshing machines, or to eat weedy straw stacks, and then be allowed to run at large. The screenings should be gathered at once after threshing, and either burnt or finely ground or cooked before feeding.

Sheep are excellent weed controllers. A few sheep should be kept on every farm. They pack and clean the summerfallows, keep the lanes, fence lines, and building sites free from weeds and other growth.

(c) *Water* (in the form of streams, rivers, irrigation ditches, and canals) carries weed seeds from one district to another. All banks should be kept free from weeds. New earth works should be levelled down when made, and be periodically cultivated or sown to perennial grasses. Brome grass, although sometimes objected to

because of its persistent root system, sweet clover (a biennial) and alfalfa are excellent to sow on irrigation banks and the banks of rivers and streams. A mixture of white clover or alsike, timothy, and Western Rye grass is a very safe mixture to use at all times to keep weeds down on the banks of running water. This mixture is not as effective as Brome. Banks that have been seeded down should be cut for hay before weed seeds form, or they should be pastured closely with sheep or other livestock, except hogs. Hogs root and destroy the stand of grass. Under no consideration should weeds on ditch banks be allowed to go to seed.

(d) *Wind* carries seeds of Perennial Sow Thistle, Canada Thistle, and Blue Lettuce for many miles. Tufts of silky hairs are attached to the seeds, which aid the wind to carry them great distances. Plants of Russian Thistle, Tumbling Mustard, and Tumble Weed break off if allowed to mature, and roll before the wind, depositing seeds as they go. Fence wires should never be lifted to allow such weeds to pass through. Farms should be well fenced at all times to catch any such tumbling weeds, which should be pulled out and burnt.

CLASSIFICATION OF WEEDS

Weeds belong to one of the following classes: annuals, winter annuals, biennials, and perennials.

Annuals are those that grow from seed, blossom, produce seed, and die the same season. They usually have small fibrous roots, and produce a large quantity of seed. Examples of these are Wild Oats, Wild Mustard, Russian Thistle, Russian Pigweed, Lamb's Quarters.

Winter annuals are those that germinate in the fall of the year, remain green all winter, and continue their growth in the spring from where they left off the fall before. They complete their life within one year. The following are winter annuals as well as annuals: Stinkweed, Hare's Ear Mustard, Ball Mustard, Tumbling Mustard, False Flax, Wormseed Mustard, Blue Bur, Shepherd's Purse.

Biennials are those that require two seasons to complete their growth. The first season is usually spent in producing a small plant and storing up nourishment. The second year is when the flowers and seeds are produced. Grey and Green Tansy Mustard and Burdock are examples.

Perennials are those that continue to grow from year to year. They propagate both by seed and underground root stocks that often go out great distances from the parent plant. There are shallow and deep-rooted perennials. Canada Thistle, Perennial Sow Thistle, and Blue Lettuce have deep-rooted underground root stocks, while Quack Grass and Sweet Grass have shallow root stocks.

GENERAL PRINCIPLES OF ERADICATION

The following are a few of the general principles that have been found effective for the eradication of annuals, winter annuals, biennials, and perennials:

(a) Annuals:

1. Sow clean seed.
2. Never allow weeds to ripen seeds.
3. Plants that have matured seeds should be pulled at once and burnt.

4. Cultivating behind the binder, or as soon as possible after harvest, with a disk, spring-tooth cultivator, or straight-tooth cultivator, has a similar effect to skim-plowing. Fairly large seeds such as Wild Oats and Ball Mustard may be plowed under two to three inches deep and with the proper amount of moisture and heat will germinate. Very fine seed or small seeds (such as Lamb's Quarters and Russian Pigweed) should not be covered more than an inch or an inch and a half. Fall plowing for the eradication of such weeds is ill-advised. Disking is better; it covers the seeds just lightly.

5. Skim-plow two to three inches deep in the fall after harvest. This covers weed seeds, many of which germinate that fall, and are destroyed by the frost. Others will start the following spring, and these will be destroyed by cultivation before sowing the crop, or at the time of plowing for the summerfallow, which may follow.

6. Spring cultivation, when done early, covers weed seeds which germinate readily, and the young plants can later be killed by a further cultivation or plowing.

7. Light harrowing, after the crop is two to three inches high, pulls out many annuals. The crop may be harrowed two to three times until it is six inches high. Some grain will doubtless be pulled out, in which case a slightly heavier seeding may be advisable. Harrowing will pull out such plants as the Mustards, Stinkweed, and Russian Thistle, but will not affect Wild Oats.

8. The pasturing of livestock on weed-infested land, particularly on summerfallow land, is recommended. Sheep are the best weed scavengers.

9. Pull by hand plants that appear in the crop. Pull early. It is advisable to pull before any seeds have formed.

10. Spring or fall cultivation, followed by a well-worked summerfallow, will germinate a very large percentage of the weed seeds. The resultant plants are cut off by cultivation or eaten by livestock. Keep the summerfallow black until freeze-up.

If Wild Oats, however, are the major problem, the summerfallow should not be worked after September 1st, for the reason that Wild Oat seeds may be brought close to the surface that would not germinate in the fall, but will grow with the crop the following spring.

If the weather in the early spring is warm and moist, do no spring cultivation until the Wild Oats appear above the ground an inch or more; then cultivate with a duckfoot cultivator about three inches deep. Leave for a week; then cultivate with a rod-weeder again, following up immediately with the drill. There are those who rod-weed again in about four days after the grain is sown. When so doing the rod-weeder should be set to such a depth as not to seriously disturb the seed. This operation packs the soil and destroys any weed growth that might otherwise appear in advance of the crop.

If the spring is dry and cool, do no spring cultivation; simply drill in the grain as early as advisable. To get the seed down to the proper depth, it may be necessary to increase considerably the pressure on the drill. If this does not work, a shallow cultivation with a duckfoot cultivator should be given, followed immediately with the drill. Rod-weed about four days after seeding for the reason above mentioned. For further information see article in this bulletin on Wild Oats.

11. Sow fall wheat or fall rye on land that has been summerfallowed from early spring. Annuals that grow in the crop will then fall be killed by frost. Others that germinate in the spring will probably not mature as soon as the crop.

12. Fall or spring cultivation followed by spring plowing and planting to a hoed crop. The hoed crop should be cultivated frequently to thoroughly clear of weeds. Corn or sunflowers, when grown on weedy land, should be planted in check rows. After the cultivator has been used, go through the crop with a hoe to cut out any weeds close to the plants that the cultivator failed to reach.

13. Seeding down to permanent grass mixtures followed by pasture and hay crops.

14. On irrigated land, seeding to alfalfa. Old alfalfa stands, when broken, usually are quite free of all annual weeds.

15. Seeding to sweet clover. The sweet clover is cut for hay or pastured before the weeds go to seed.

16. Barley sown heavily late in the spring, at from two and one-half to three bushels per acre, immediately after the ground has been cultivated to destroy all green growth, will usually germinate quickly, thereby getting a start on the weeds. The thick stand and quick maturity acts as a good smothering crop. After the barley is harvested follow by disking or other surface cultivation the same year. This will start a fresh crop of weeds.

Intensive and repeated summerfallow, to which there are objections, or a systematic rotation of crops in which grass and pasture crops are to be found, are (generally speaking) the two types of farming to follow if we wish to have our land free from annual weeds, which are the chief cause of heavy dockage and decreased yields.

(b) Winter Annuals:

Winter annuals can be eradicated by the methods outlined for the eradication of annuals. If the winters are open, winter annuals often come into blossom; and produce seeds which very early, or when we are least expecting it, mature and re-seed. Constant vigilance is necessary for the rapid and complete eradication of winter annuals. The farmer who goes over his fields when systems of cultivation cannot be employed, and hand-pulls stray winter annuals will be well repaid. A good plan would be to gather all such plants in a sack, and burn them. Late fall cultivation is necessary, also the thorough working with a wide-share cultivator, followed by the harrow in the spring. This should be done as early as possible, and again just before seeding.

(c) Biennials:

Biennials can be destroyed by plowing, hoeing, or pulling; preferably the first year of their growth, or early the second year. Fields badly infested should be summerfallowed.

(d) Perennials:

Perennials are very difficult to destroy. Canada Thistle, Perennial Sow Thistle, and Blue Lettuce will each be dealt with separately. These are the chief perennials causing us serious loss.

CHEMICALS

During the years 1927 and 1928 the Department conducted many experiments at different points in the Province with a number of chemicals that have recently been put on the market by different manufacturing companies for the eradication of perennials, such as Sow Thistle and Canada Thistle. Encouraging results have been obtained. It is the intention of the Department to conduct further tests in 1929 before pronouncing upon the effectiveness of any particular chemical.

BURNING WEEDS

Stubble should be burnt as soon as it is dry enough. Seldom do we get it sufficiently dry to burn in the fall. The fire can be made to travel and spread by the use of the harrow.

Tumbling weeds, when ripe and dry, can be stopped from rolling by scattering straw on them, and burning. Roadsides, fields, and waste places can be cleaned up in this way. Fence lines should be freed of such weeds by pulling them out and burning.

The Weed Burner has been greatly improved the past few years. Its use in the fall of the year, as well as in the spring, to burn dry and semi-dry plants, is particularly valuable. The public is much interested in this machine. There is a great need for it.

PERENNIAL SOW THISTLE

(*Sonchus arvensis, L.*)

Perennial, introduced from Europe. Other English names are Field Sow Thistle, and Creeping Sow Thistle. Stems are one to five feet high, hollow, simple, with few leaves, and branching at top. The entire plant contains a bitter milky juice. Leaves six to twelve inches long, pointed, deeply cut, the lower divisions directed backward, clasping the stem with their heart-shaped base and edged with sharp spines. Flowers bright yellow, one and one-half inches across, in corymbs, closing in strong sunlight; the flower stalk and the scaly bracts surrounding the flower-heads bristly, covered with long glandular hairs. It flowers from July until late in the fall.

The seed is about one-eighth inch long, dark reddish brown, oblong, closely and deeply ridged lengthwise, the ribs wrinkled transversely, giving the seed the appearance of being ridged both ways, bearing at the top a tuft of white silky and persistent hairs.

The root stocks extend along about four inches below the surface of the ground. Great numbers of new plants shoot up from the root stocks.

The Annual Sow Thistle is sometimes mistaken for Perennial Sow Thistle. As the term would indicate, it is an annual plant. Its roots are fibrous. It has no underground root stocks. The stems are nearly simple, one to four feet high. They are very slightly branching and covered with coarse hairs. The leaves are deeply notched, each leaf being terminated by a large lobe. The base of the leaves clasp the stem with two sharp points. The flower is pale yellow, and smaller than in the case of the Perennial Sow Thistle. It is about one-half an inch to one inch in diameter. The seed is somewhat smaller. It is a little shorter, flattened and pointed at the basal end. The longitudinal ridges are wider apart, much finer, and the whole surface of the seed, the ridges as well as the inter-spaces, is finely wrinkled transversely.

Perennial Sow Thistle occurs in towns and cities, in vacant lots, on refuse dumps, in lumber yards, along the streets, on banks of rivers and streams, in stock yards, in railway yards, in gardens, around stations, elevators and loading platforms. In fact, in many towns and cities it is to be seen in every direction.

It is abundant in many of our cultivated fields, along roadsides, in wooded areas, around lakes, on abandoned farms, on reserves and school lands, along irrigation ditches, in the foothills, on ranch lands, in nurseries, in cemeteries. In 1913, Perennial Sow Thistle was reported at one place only in Alberta, a short distance east of Medicine Hat. Now it is to be found in almost every district over the entire Province.

If Perennial Sow Thistle becomes established, it is one of the most difficult weeds to eradicate.

The following methods of eradication have proved effective :

(a) Dig out the roots. If the patches are quite small, as they usually are when the weed makes its first appearance, they can be dug out and the roots burned. Such areas have to be watched constantly for appearance of new plants, which also should be dug out at once. Exercise caution that all roots are obtained and destroyed.

(b) Cover with a good grade of tar paper. Where the patch is small, level it off with a spade for a distance of four to five feet all around it. Then lay tar paper down, overlapping the layers from six inches to half the width of the strips of paper. Cover the tar paper with a layer of dry sods, closely laid together, and over this two to three inches of fine loose earth. The object of doing this is to cut off air and sunlight. Care must be taken to level the ground, so that there are no lumps or stalks left to penetrate the paper, and so that the paper can lie snugly. The covering should be left in place for two years, and repaired if damaged.

(c) Oil: Numerous experiments have been conducted during recent years with used oil from the crank cases of motors and also with fuel oil. The application of oil to Perennial Sow Thistle patches has proven effective in certain districts in the Province, particularly on loose structured soils. On gumbo soils, or soils of a heavy clay nature and very compact in structure, the results with oil are not as satisfactory. To get the best results it is advisable to select a hot dry day, with the ground as dry as possible. The reason is that dry earth absorbs the oil more readily. The heat from the sun thins the oil, causing it to penetrate the ground more readily. Remove all growth, and if the surface is very hard and caked, it is advisable to chop or loosen it up somewhat, in order that the oil will the more readily soak in to the roots. Apply the oil at the rate of two gallons per square yard, then in about two weeks give another application of one gallon per square yard. A single application of three gallons per square yard is not as effective as the two applications. The patch should be watched and if any plants show up, oil should be applied. The even application of oil is essential. This can be done by spraying. It is necessary to apply enough oil to soak down to the root stocks, which are about four inches beneath the surface.

Applications of oil can be used advisedly on patches found among trees, rocks, around shores of lakes, or other places where other methods prove futile.

(d) Hoeing: Small patches, if hoed deeply once a week, will eventually destroy Perennial Sow Thistle. No young plants should be allowed to appear. This method may require two years.

(e) Pulling: Continued pulling of the plants will weaken the Sow Thistle and doubtless kill a few. This method cannot be recommended except as a control method. It is doubtful if complete eradication can be effected in this way.

(f) NEVER ALLOW THE PLANT TO SEED. Seeds will travel before the wind for miles, and pollute fresh areas.

(g) Cultivation: For large tillable areas, eradication by cultivation is the only recommended method for eradication of the Perennial Sow Thistle.



PERENNIAL SOW THISTLE
(*Sonchus arvensis*, L.)

To do this, plow four to five inches deep just before freeze-up in the fall. The land is left rough all winter. The frost attacks, weakens, and kills many of the exposed roots. As soon as the weed starts in the spring, the land should be cultivated once every week with a wide-toothed duck-foot cultivator with well-sharpened teeth, or preferably with a rod-weeder. NEVER LET A SINGLE PLANT APPEAR ABOVE THE SURFACE. The reason why the thistle is often not completely eradicated in one season's cultivation is because cultivation was not frequent enough to keep down all growth. If the land is kept black throughout the spring, summer and fall, complete eradication will be effected in one year.

If a few large patches exist in a field, it is better to cultivate each patch separately before going over the whole field; otherwise there will be danger of trailing roots on to clean parts of the field. Work around the patches, and in towards the centre.

Any roots that are brought to the surface, as the result of cultivation, should be gathered and burnt.

Black summerfallow is the one standard method to be recommended for the eradication of Perennial Sow Thistle.

Effect of Perennial Sow Thistle on other crops: While crops such as Brome Grass or Alfalfa will have a tendency to keep Perennial Sow Thistle in control, the writer has witnessed the complete choking out of these crops by the thistle in a very few years. As far as we know now there is no cultivated crop that will crowd out this weed.

Chemicals: Various chemicals are now on the market for the eradication of this weed. The Department has been conducting experiments with a number of these and purposes conducting further tests before pronouncing upon the effectiveness of any particular chemical.



FALL DANDELION
(*Leontodon autumnalis*, L.)

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FALL DANDELION

(*Leontodon autumnalis*, L.)

Other English names: August Flower and Autumnal Hawkbit.

Introduced from Europe. Perennial. The root stalks are short, thick, and frequently divided into several heads, each of which bears a thick tuft of toothed leaves, somewhat resembling those of the Common Dandelion. The flower heads are over an inch across and are bright yellow in color.

The seed is a quarter of an inch long, brown, linear, ribbed lengthwise, marked with fine lines crosswise; pappus dirty white in one row of feathery bristles, about the length of the seed itself.

It flowers from July to freeze-up; the seeds ripen by August.

It propagates by seeds and by division of the crown. It is often mistaken for Perennial Sow Thistle.

Eradication:

(a) It will give trouble on lands worked under short rotation, such as, cereal grain, clover, and grasses. Hoed crops introduced into the rotation are recommended. Any well-worked summerfallow will effect a complete eradication.



POVERTY WEED
(*Iva axillaris*, Pursh)

POVERTY WEED

(*Iva axillaris*, Pursh)

Perennial. Native to Western Canada. It grows from six inches to one foot high. Stems are herbaceous, branching, and growing from creeping root stocks. Leaves are thick, obovate to linear-oblong, without teeth or divisions, rough-hairy. The lower leaves on the plant are opposite the upper leaves and are alternate. The flowers are quite small and inconspicuous. The plant has a rank odor. It is a persistent perennial, growing in patches, and is difficult to eradicate once it becomes well established.

It flowers from June to August; and ripens seed from July to September.

The seed is about one-eighth of an inch long, varying from a yellowish-brown to black, with a mealy surface. Two seeds are usually found in each flower-head.

It grows mostly in Central and Southern Alberta.

Eradication:

(a) Plow deep, and plant to potatoes or other hoed crop, which should be cultivated thoroughly once every week during the growing season.

(b) Large areas should be summerfallowed. To do so, plow early in June, or the latter part of May, and keep absolutely black the rest of the growing season by using a duckfoot cultivator or rod-weeder, or any other broad-shared cultivator. It is easier to eradicate in hot, dry weather than in wet weather.

CANADA THISTLE

(*Cnicus arvensis, L.*)

Perennial, introduced from Europe. Deep running root stocks, which extend along below the surface of the ground and parallel to it. These send up new plants every few inches. Stems erect, two to four feet high. Leaves are narrow, deeply pinnatifid, waved and crested, clasping the stem slightly at the base, very prickly, dull green color, a smooth glossy appearance on the upper side while the under surface is greyish, being covered with a fine down. Flower heads are numerous, in a large loose corymb at the top of the stems. Flowers vary in color, ranging from pale purple through shades of pink to white. There are two kinds of flowers, viz.: male flowers which form no seeds, and female flowers which form seeds. The former are about one inch across, while the latter are only half the size. The impression that the color of the flower denotes sex is not accurate. The difference in color is merely a genetical one.

The seed is one-eighth of an inch long, light brown, elongated, oblong, smooth, somewhat flattened and curved, marked with faint longitudinal lines. The top is nearly round, flat, and has a narrow rim with a small cone-shaped point in the centre. Attached to the rim is a copious white feathery pappus, easily detached if disturbed. This downy substance aids the seed to drift through the air for long distances. It flowers from June to September.

Eradication:

(a) Dig out the roots. If the patches are small, the roots may be dug out with a spade. One or two operations are usually sufficient. Close watch must be kept for straggling plants, which should be treated promptly in the same manner.

(b) Keep the thistles thoroughly cut with a hoe every few days throughout the growing season. Never allow a single plant to appear above the surface of the ground. It may take two seasons to completely eradicate the weed in this way.

(c) NEVER LET THISTLES GO TO SEED.

(d) Spudding will prevent seeding. Consolidated patches should be cut with a scythe, or mowed, if there is danger of seeding. If the seed is liable to mature after cutting, rake and burn, or preferably scatter straw on the patches that have been cut and burn when dry.

(e) Cover with tar paper. Where the patch is small, level it off with a spade for a distance of two to three feet all around it. Then lay tar paper down, overlapping the layers from six inches to half the width of the strips of paper. Cover the tar paper with a layer of dry sods closely laid together, and over this two to three inches of dry dirt. The covering should be left in place for two years, and repaired if damaged.



CANADA THISTLE
(*Cnicus arvensis*, L.)

(f) Oil: Fuel oil or used oil from the crank case of motors if applied in sufficient quantities to saturate the ground well down to the underground root stocks will with one application of three gallons per square yard kill most of the thistles. If any stray plants show up afterwards they should be dug out or treated again with oil. Oil for Canada Thistle patches can be recommended only where other methods of eradication are not practicable. The oil will kill all other vegetation besides the thistles. The application of oil on Canada Thistle patches is particularly effective in those districts where the soil is of a loose structure. On gumbo soils or soils of a heavy clay nature and very compact in structure the results with oil are not as satisfactory. To get the best results it is advisable to select a hot dry day, with the ground as dry as possible. The reason is that dry earth absorbs the oil more readily. The heat from the sun thins the oil, causing it to more readily penetrate the ground. Remove all growth, and if the surface is very hard and caked, it is advisable to chop or loosen it up somewhat, in order that the oil will the more readily soak in to the roots.

(g) In cases where large areas are infested, the above methods are impracticable. The following methods of eradication have been found effective:

(1) Plow deep to get below the roots just before freeze-up in the fall. The land is left rough over winter. The frost will weaken and kill many of the exposed roots. As soon as the weed starts in the spring the land should be cultivated with a duck-foot cultivator once every week until well into the fall. NEVER ALLOW A SINGLE PLANT TO APPEAR. This method will completely eradicate Canada Thistle in any kind of soil in one year. The use of the rod-weeder cannot be too strongly recommended.

If there are patches in a field, care must be exercised during their cultivation not to drag thistle roots over the clean portion of the field. Never pass harrows, for instance, through the patches and proceed over the clean part of the field. The thistle patches should be cultivated separately.

(2) Plow shallow just to get below the roots immediately after harvest. Cultivate until late in the fall with a duck-foot cultivator. Continue this cultivation in the spring until June; then plow deep, work well, and seed thickly to barley. If this system of cultivation is followed for two years, it will practically eliminate the thistle, particularly in the case of minor infestations.

(h) To simply cut when the stems are hollow, or when the plant is in full blossom, is ineffective. However, the roots are then at their weakest stage and if plowed at once and cultivated regularly till freeze-up, allowing no thistles to appear at any time, it will thin out many of them. Usually, it will be necessary to continue cultivation with the duck-foot cultivator in the spring until July or August. The land will then be in excellent condition for Fall Rye or Fall Wheat. A short crop, such as barley, might safely be seeded in June. After the barley is harvested, plow and cultivate as before till winter if any thistles showed up in the crop.

The *rod-weeder* is an implement that has to a certain extent replaced the duck-foot cultivator on many farms. It can be recommended for land that is in a good state of cultivation, free from sod, stones, roots, etc. It will not do proper work unless the soil

is sufficiently loose for it to work in at least three to four inches. The teeth of the duck-foot cultivator must be kept sharp, otherwise very unsatisfactory results will be obtained. Use wide teeth on the cultivator.

(i) Roadsides, head-lands, and fence lines too frequently are left uncut, with the result that all kinds of weeds, including thistles, go to seed and pollute adjoining farms. This should not be permitted. It will make clean farming an impossibility, and is contrary to the provisions of The Noxious Weeds Act.

(j) With the exception of oil, no chemical has yet been discovered that will eradicate this weed. Salt has been advocated, but the writer is unable to recommend its use.

(k) On irrigated land, seeding down to alfalfa will in a few years clean up a field infested with Canada Thistle.

(l) Seeding down to Brome: The dense root system of Brome will in four to five years choke out practically all Canada Thistle. The continued use of Brome in the rotation has proved effective in the control of the weed.

(m) A rotation of crops consisting of cultivated crops (such as field roots, corn and sunflowers), alfalfa, sweet clover, and perennial grasses, will keep the weed in check and prevent the existence of densely consolidated patches. Straight grain-growing will eventually produce a very weedy condition; and unless black summerfallow is resorted to, under that system of farming Canada Thistle will come in, and in time be responsible for heavy losses.

(n) Chemicals: Various chemicals are now on the market for the eradication of this weed. The Department has been conducting experiments with a number of these and purposes conducting further tests before pronouncing upon the effectiveness of any particular chemical.



BLUE LETTUCE
(*Lactuca pulchella*, D.C.)

BLUE LETTUCE

(*Lactuca pulchella*, D.C.)

Native. A deep rooted perennial with underground root stocks. From the root, and also from the root stocks, fresh stems are sent up. During the flowering season it is doubtful if it sends up stems from the running root stocks, though it does from the base of the original stem, even without being cut off; and when cut below the crown, two or more stems soon arise to take the place of the one that was cut away. Stems two to three feet high and leafy below; whole plant smooth and covered with a fine bloom, filled with milky juice. Leaves variable, linear lance-shaped, or oblong; without teeth or divisions or sometimes dentate or pinnatifid, the divisions directed backward; stem leaves less divided and stalkless. The flower heads are nearly one inch across, and pale blue in color. The flowers are borne in panicles at the top of the plant, and are not very numerous.

The seed is about one-quarter inch long, including the short thick beak, the tip of which is whitish, expanded into a short, cup-shaped disk, red when immature, slaty-grey when ripe; club-shaped, flattened with thick ridges down each face; whole surface dull and rough; pappus long, white, and silky.

It flowers from June to July, and the seed is ripe in August.

It propagates by seeds, and deep persistent running root stocks.

It occurs on railway grades, irrigation ditches, in grain fields, on roadsides, etc. It is generally found in patches. This plant is increasing very rapidly in the Province. Large patches are frequently seen growing in grain fields that have completely choked out the grain.

While Blue Lettuce is not so difficult to eradicate as Canada Thistle or Perennial Sow Thistle, it should be eradicated as soon as noticed; or it will be, in a short time, the cause of greatly reduced yields.

The following methods of eradication are recommended:

(a) NEVER ALLOW IT TO GO TO SEED. Keep it cut when found around edges of fields, and along roads, railway rights-of-way, and waste places.

(b) Dig out small patches. Collect and burn the roots, and then hoe at intervals.

(c) Fall plowing just before freeze-up, if done deep and left rough over winter, will sometimes completely eradicate the weed and will always greatly thin it out. Seldom is complete eradication effected in this way.

(d) Late spring plowing, followed immediately with a heavy seeding of barley in June, will eradicate many of the plants.

(e) The black summerfallow, as recommended for the eradication of Canada Thistle, will completely eradicate it.

(f) Blue Lettuce becomes extinct in an intertilled crop, providing the crop is kept well cultivated.

(g) It is readily choked out by seeding down to Brome, Western Rye, Alfalfa, Timothy, and very often by Sweet Clover.

N.B.—All the methods employed for the eradication of Canada Thistle will, without doubt, get rid of Blue Lettuce. It follows that plowing should take place before the weed goes to seed, and that it must be watched and cultivated afterwards, keeping it black at all times if positive and rapid eradication is to be expected.





TOADFLAX OR BUTTER AND EGGS
(*Linaria vulgaris*, Hill)

TOAD FLAX

(*Linaria Vulgaris, Hill*)

Other English names: Butter and Eggs, Snap Dragon, and Yellow Toad Flax.

Introduced from Europe; a persistent, deep-rooted perennial. Stem erect, slender, becoming wiry. Hairless, slightly waxy. Leaves stalkless, extremely numerous, mostly alternate, linear, without teeth or divisions, acute at both ends. Flowers nearly an inch long, showy pale yellow with orange lips, borne in erect, dense racemes; the two-lobed corolla closed and mouth-like, but, by gentle pressure at the sides it opens and closes like the muzzle of an animal.

The seed is about one-twelfth of an inch in diameter—including the wing—dark brown to black, flat, round or oval, disc-like, roughened and surrounded with a circular wing, as broad as the seed itself, finely radiate.

It flowers from June to September; seeds ripen by August.

It is a persistent weed in waste places, roadsides, and in many of our cultivated fields.

Eradication:

- (a) Hand-pull in wet places where cultivation is impossible.
- (b) Short rotation of crops with a deep, thorough cultivation in the spring and fall will suppress it.
- (c) Summerfallow. Badly infested areas should be given a thorough summerfallow. To do this, plow early in June to a good depth of not less than six inches. Keep the summerfallow absolutely black until freeze-up.
- (d) Infested areas can be plowed either in the fall or spring, but preferably in the fall just before freeze-up, and then planted with hoed crop which should be kept clean and free from any appearance of this weed.
- (e) Badly infested pasture lands should be brought under cultivation not later than July and summerfallowed for the rest of the growing season.

QUACK GRASS

(*Agropyron repens, L.*)

Other English names: Couch, Scutch and Twitch Grass.

Introduced from Europe. Perennial. It spreads by shallow underground root stalks which form large matted beds. Quite a number of flowering stems are produced. They are smooth above and downy below. Flowers form a narrow spike with the spikelets lying flat above the stalk. The leaves are dark green, ribbed, and slightly hairy below.

The seeds are in scales about three-eighths of an inch long. The kernel is shaped like a small grain of wheat, three-sixteenths of an inch long, with wide open groove. The basal end, which bears the germ, is pointed, while the other end is blunt and fuzzy. The seeds of Quack Grass are often found in grass seeds, such as Western Rye and Brome. Caution should be taken not to buy grass seed infested with these seeds.

It flowers about the end of June; the seeds ripen in July.

It propagates by seeds and creeping underground root stalks which are near the surface of the ground. When the root stalks are broken by plowing before cultivation, each small particle is capable of forming a new plant. Care, therefore, should be taken not to drag these pieces from one field to another.

Eradication:

(a) Plow shallow immediately after harvest. Work at intervals with spring-tooth cultivator or chain harrow, or any implement that will bring the roots to the surface. Place the roots in heaps and burn when dry. The following spring continue this cultivation until the 1st of June, or even later, and seed very heavily to barley.

(b) Never use a disk, as this implement cuts the under-ground root stalks into short lengths, each of which produces a new growth.

(c) Allow the weed to grow undisturbed until it comes into flower in June; then plow shallow. Work down to get a seed bed, about two and a half inches deep, and drill immediately with a heavy seeding of barley.

(d) Allow the weed to grow undisturbed until about June 20th, or until it comes into the flower stage. Plow shallow and cultivate at intervals until freeze-up with a spring-tooth cultivator, chain harrow, or any other implement that will bring the roots to the surface. The roots after each operation should be gathered in heaps and burned when dry.

(e) Many farmers in the North-Central portion of this Province have found that the most effective method of eradication is



COUCH, QUACK OR SCUTCH GRASS
(*Agropyron repens*, L., Beauv.)

to plow in June. Work shallow with a cultivator as above to bring the roots to the surface; then plow in about four weeks' time again. Repeat the plowings as often as possible during the growing season and cultivate after each plowing as often as possible to bring the roots to the surface. Always see to it that as many of the roots as possible are gathered into heaps and burned after each operation. By plowing, the roots are disturbed; there is a tendency to break off the root hairs and prevent the root stalks from growing. Plowing also has a tendency to dry out the ground, incidentally having a drying and killing effect on the roots of the plant. The writer has known farmers to plow as often as five or six times in the season with excellent results. While the plowing may be difficult to do properly, the mere fact of disturbing the ground with the plow seems to have a beneficial effect in eradication.

SWEET GRASS

(*Hierochloe odorata, L.*)

Other English names: Indian Hay and Seneca Grass.

A native grass, sweetly scented. It is a perennial. Deep-rooted, with wide-spreading white root stalks. The root stalks are rather shallow and shoot up new plants every few inches. The whole plant is bright green in color, turning to golden-yellow when mature. The flowering stems are sent up early in the spring. The flowers are borne in loose panicles which contract and become a dark golden-brown as the seeds ripen.

It flowers usually in May, occasionally in April; the seeds ripen in June and July.

The seed is enclosed in the inner smooth scales. The naked seed closely resembles timothy, and is often got in grass seeds such as timothy.

It propagates by seeds and running root stalks.

It occurs more or less in practically every district in the Province of Alberta, but is found in more profuse growth in the park and forest areas.

Eradication:

(a) It is easier to control and eradicate than Quack Grass. However, the same methods as for the eradication of Quack Grass should be employed.



SWEET GRASS
(*Hierochloe odorata*, L.)

WILD OATS

(*Avena Fatua, L.*)

Annual, of European origin. Introduced into the West from Eastern Canada and United States. Plants grow from two to four feet high, and closely resemble some varieties of cultivated oats. The panicle is very spreading, and from six to twelve inches long.

The seeds vary in size and color very greatly; there being all shades of brown, black, grey, and yellow. They are generally slimmer and harder than cultivated oats. They are easily recognized by the peculiar sucker mouth or horseshoe-shaped scar at the base of the seed, and also by the stiff bristles surrounding the basal scar, which, however, are not always present in threshed grain. Wild Oat seeds usually have a strong twisted right-angled dorsal awn, frequently broken off by threshing.

Wild Oats propagate by seed only. They will often stay in the ground for many years, and then germinate when brought near the surface. They retain their vitality longer than cultivated oats. The seeds on the upper part of the head and on the tips of the branches ripen earlier than those less exposed. The earlier seeds are dropped before or during harvest. The later maturing seeds are harvested with the crop, and remain in commercial wheat, oats, and barley. The continuous growing of cereal grains is, therefore, conducive to pollution by Wild Oats.

The loss in Western Canada annually due to Wild Oats is enormous and is rapidly on the increase.

The following methods of control and eradication have proved effective:

(a) Sow clean seed. The value of clean seed cannot be over estimated. Too often do we find farmers sowing Wild Oats through their drills. The average fanning mill will not take all Wild Oats out of wheat. It is absolutely impossible to remove all of them from oats and barley. An indent machine is the only machine with fair capacity that will make a complete separation from wheat. The discreet and far-seeing farmer will buy clean seed rather than sow a single Wild Oat. Wild Oats multiply with tremendous rapidity.

(b) Skim-plow two or three inches deep in the fall immediately after harvest to turn under the Wild Oats. A small number will grow in the fall. Many others will start the following spring, and be destroyed by cultivation before sowing the crop. Seeding to green feed, such as oats, is advisable; providing the green feed is cut before the Wild Oats ripen.

(c) Double-disking in the fall behind the binder is good for the same reason as skim-plowing. Skim-plowing is generally admitted to be better than disking.

(d) If the land has been skim-plowed in the fall and the plants destroyed the following spring by cultivation, it would be unwise to plow the land before seeding as a fresh supply of Wild Oats would be brought up, which would grow with the crop of grain; the idea being to get the top three inches of soil as free from Wild Oats as possible.

(e) Spring cultivation with a disk should be done early to get the Wild Oats to germinate. Plow five or six inches deep about the 10th of June, harrow and cultivate several times to destroy fresh growth of Wild Oats until July 15th. Then seed to Fall Rye which can be pastured that fall and the next spring.

(f) Double disk in the fall, then plow deep fairly early in the spring. Work well till late in June; then seed thickly to barley or oats. Cut for green feed before any Wild Oats ripen.

(g) After having skim-plowed or double-disked in the fall or in the early spring, plow the usual depth for summerfallow early in June. Harrow down at once. Cultivate, using a spring-toothed harrow, a duck-foot cultivator or a rod-weeder every two weeks till September 1st, or when a short, green growth of wild oats appears. Each cultivation should be deeper, until the bottom of the furrow slice is reached, if possible. This has a tendency to bring up for germination more Wild Oats. Do no fall cultivation. If there is any fall growth it is preferable to pasture it.

If the weather in the spring is warm and moist, do no spring cultivation until the Wild Oats appear above ground. Cultivate with a duck-foot cultivator as soon as two leaves appear on the Wild Oats plant, to a depth of about three inches. Leave for a week, or longer; then cultivate with a rod-weeder, following up immediately with the drill, sowing wheat or oats. There are those who rod-weed again to such a depth as not to injure the seed. This operation packs the soil and destroys all weed growth that may have started.

If the spring is dry and cool, do no spring cultivation. Simply drill in the grain as early as possible. Very often, however, to get the seed down to the proper depth, it may be necessary to increase considerably the pressure on the drill, or even do a shallow cultivation with a duck-foot cultivator. If any cultivation is done, drill immediately, not allowing time for weed seeds to sprout before the grain is seeded. Rod-weed about four days after seeding for the reason above mentioned. Summerfallow may be resorted to every other year to clean up a badly infested field.

(h) Timothy, Western Rye, Brome, or a grass mixture is often seeded with the wheat or oats on land that has been summerfallowed. Leave down to grass for several years, and pasture or take the hay off. The longer it can be left down profitably to grass the better, to allow Wild Oats to decay. If Brome becomes sod bound, severe double-disking will thin it out, producing a stand with greater length of straw. Old alfalfa stands on irrigated land seldom show any Wild Oats when broken. Sweet Clover for pasture or hay is also a good cleaning crop, as many Wild Oats come up and are pastured off or cut for hay before ripening.



WILD OATS
(*Avena Fatua, L.*)

(i) Hoed crops on land worked from early spring, if well cultivated during the growing season, are recommended for Wild Oat eradication.

(j) Screenings or grain containing Wild Oats should not be fed to livestock with the exception of sheep, without first being ground or cooked. Work-horses are often responsible for clean land becoming polluted with Wild Oats, and the farmer wonders why his crop is weedy. Threshing machines and bundle racks should be thoroughly cleaned out and swept off before moving. All screenings left after threshing should at once be lifted or burnt. Hogs and other livestock running at large eat them; and as a result of imperfect digestion, Wild Oats will be spread wherever they roam.



WILD BUCKWHEAT
(*Polygonum Convolvulus, L.*)

WILD BUCKWHEAT

(*Polygonum Convolvulus, L.*)

Annual, of European origin. A twining vine with branching stems, and arrow-head shaped leaves. The flowers are greenish-white in color, and are borne in clusters in the axils of the leaves.

The seeds are a dull brownish-black in color, and triangular in form. Sometimes the hull drops off, giving the seed a white appearance.

It is quite commonly found in grain fields throughout the Province. Frequently, we find it causing quite a considerable loss in yield.

The seeds are difficult to separate from grain—an indent possibly effects the most perfect separation.

Eradication:

- (a) Sow clean seed.
- (b) Skim-plow, or disk, in the fall as soon as possible after the binder. If there is a reasonable amount of moisture, many seeds will germinate and produce new plants, which will be destroyed by the winter frosts.
- (c) If the above operation has not been done in the fall, do it as early as possible in the spring to prevent early growth, which should be cultivated off before seeding.
- (d) Harrow the growing crop several times to pull it out and destroy any young buckwheat plants.
- (e) Summerfallow by effecting either a fall or a spring cultivation, or early plowing, followed by plowing the usual depth for summerfallow in June. As often as young buckwheat plants appear, cultivate them off, going to a slightly greater depth at each cultivation. A well-worked summerfallow almost invariably cleans the land of this weed fairly well.

WILD MUSTARD

(*Brassica arvensis*, L., otherwise
Brassica sinapistrum)

Other English names: Charlock, Field-kale and Ontario Mustard.

Annual, introduced from Europe. Stems erect, branching, one to three feet high, rough, with stiff, somewhat downward directed hairs. The purple at the junction of the branches with the stem is a striking characteristic. Lower leaves stalked, usually deeply indented or lobed, with the terminal lobe large; upper leaves mostly stalkless. Roots fibrous. The flowers are yellow, showy, and about two-thirds of an inch across. Seed pods are from one to two inches long, slightly constricted between the seeds, ribbed, and rising obliquely on short thick foot stalks, tipped with a long empty beak, which breaks away whole from the ripe pod. Each contains about fifteen to seventeen seeds. A strong plant will produce ten thousand seeds.

The seeds vary somewhat in size, but are generally one-sixteenth of an inch in diameter, quite round, dark brown, or reddish black, and almost smooth.

It flowers from June to September. Seed ripens by August.

It propagates entirely by seed.

It is general throughout the Province, and particularly in the park and forest areas.

Wild Mustard is a very harmful weed. It absorbs large quantities of moisture. Its numerous seeds have great vitality, and have been known to lie in the ground for many years, and grow when brought near the surface into conditions favorable for germination.

Eradication:

(a) Sow clean seed. Any good fanning mill should remove all seeds from cereal grains.

(b) Feed clean grain particularly to work-horses. Excess of mustard seeds is injurious to the health of animals. If fed to hogs and cattle, grain containing Wild Mustard should be ground to kill germination.

(c) Hand-pull stray plants. A man at each side of a wagon can go through a grain field and clean up a large acreage of grain containing scattered plants. Pile and burn when dry.

(d) Plant a hoed crop on areas badly polluted, or seed to rape and pasture off with sheep.



WILD MUSTARD
(*Brassica arvensis*, L., otherwise *Brassica sinapistrum*)

(e) When fields are badly overrun, the following methods of eradication are recommended:

(1) Disk after the binder to cover the seeds. If there is moisture many will germinate in the fall, and can be eaten off by sheep or destroyed by frost.

(2) Shallow skim-plowing is also recommended; it makes a better job of covering the seeds. Plow immediately after harvest and harrow at once.

(3) Harrow the growing crop two to three times until six inches high, to pull out young plants. Seed a little heavier to make up for loss sustained by harrowing. It is well to give one harrowing across the field and the others lengthwise.

(4) Fall-disk or skim-plow, then cultivate early in the spring to induce further germination. The drag-harrows can be used to good advantage, although the duck-foot cultivator will do equally well and is a better general weed destroyer. About June 1st plow five to six inches deep and seed to barley. After the barley is harvested, cultivate immediately, and follow the same procedure next year. Should there be danger of mustard ripening with the barley, cut the barley for green feed.

Instead of seeding to barley immediately after plowing, harrow once, and later cultivate once, and sow heavily to green feed from June 15th to July 1st. The resultant crop will mature ahead of any mustard plants.

(5) Having given good fall and spring surface cultivation as above indicated, plow deep for summerfallow in June and harrow behind the plow. Cultivate the summerfallow frequently throughout the summer to keep it black, using a duck-foot or spring-tooth cultivator, going a little deeper each time to bring up more seeds and to cut off young plants. If there is no danger of soil drifting, the occasional harrowing and cross-harrowing of the summerfallow, with the teeth set to go as deep as possible, will pull out young plants and bring more seeds to the surface. Harrowing, however, will not replace absolutely the duck-foot or spring-tooth cultivator. The rod-weeder destroys young plants, but will not bring up seeds to the surface as well as one of the above cultivators. If the summerfallow will drift because of intensive cultivation, sheep will eat off all growth and pack the land.

(6) The following spring after summerfallow, seed to oats or wheat, harrow the growing crop once or twice and harrow in timothy or other perennial grasses or mixtures. Leave down to hay or pasture for several years.

(7) Chemicals: Spraying once or twice with a solution made up of from 75 lbs. to 100 lbs. of iron sulphate to 50 gallons of water, will destroy Wild Mustard, and is to be recommended on those areas where cultivation is not practicable.

BALL MUSTARD

(*Neslia paniculata, L.*)

Annual weed, introduced from Europe into the West. Sometimes a winter annual. Stems erect, one to four feet high, very slender. Strong plants throw out a few long branches. Whole plant a yellowish green, and is covered with small fine hairs. Lower leaves lance-shaped and narrowed at the base; stem leaves arrow-shaped, clasping the stem at the base, blunt-pointed. Flowers orange yellow and one-eighth of an inch across. The seed pods are round, borne on the end of short slender stems. They are greenish yellow when ripe and do not shed their seeds readily. Each pod contains only one seed, which is of a pale yellow color. Seeds somewhat difficult to clean out of grain because of their size. An experienced fanning mill operator with proper screens can make a perfect separation.

Ball Mustard flowers from June to August, and seeds ripen from July to September.

It occurs in grain fields, on railroads, earthworks, and in waste places.

It propagates by seed.

The following methods of eradication are recommended:

(a) Sow clean seed.

(b) All grain fed to livestock, with the exception of sheep, should be clean or finely crushed. Manure containing weed seeds should be well rotted before applying to the land.

(c) Skim-plow or disk in the fall immediately after harvest. Harrow after the plow. Many seeds will sprout in the fall. Sheep relish the young plants.

(d) If skim-plowing in the fall or fall disking has not been done, disk early in the spring. Plow about June 1st, and seed to barley; or cultivate after plowing two weeks later, then harrow and seed to green feed on July 1st.

(e) If the land has been cultivated in the fall, spring plow early and seed to wheat or oats. Harrow the growing crop two to three times when it is from three to six inches high.

(f) Seeding to grass for three or four years will greatly reduce the weed.

(g) Hand-pull scattered plants.

(h) Fall or spring cultivation, followed by a hoed or cultivated crop. Such crop should be cultivated well and often, being certain not to allow any plants to go to seed.



BALL MUSTARD
(*Neslia paniculata*, L.)

(i) Badly infested areas should be summerfallowed. Fall or spring cultivation should be followed by deep plowing about the 1st of June. Keeping the summerfallow well worked, till freeze-up, will give desired results.

(j) The following spring, after seeding to wheat or oats, harrow once or twice when the crop is from three to six inches high. At the time of the last harrowing sow timothy or other perennial grasses.

(k) Chemicals. Treatment with iron sulphate solution as for Wild Mustard will destroy the weed.

TUMBLING MUSTARD

(*Sisymbrium altissimum, L.*)

Annual and sometimes winter annual. It was introduced into the prairie provinces from Central and Southern Europe about 1887. Two to four feet high, stem branching, the lower part and the root-leaves downy and glandular, with a musky odor. It appears first as a rosette of soft, pale green, downy leaves, resembling those of the dandelion. The upper leaves of the plant are much finer than those at the base of the plant.

Flowers are a pale yellow, one-third inch in diameter. Seed pods are two to four inches long, very slender and produced abundantly along the branches. Each pod contains from fifty to one hundred and twenty-five seeds. A single plant may produce over one million seeds. When the seeds are ripe the whole plant breaks off and is blown across the prairie, scattering the seeds as it travels.

The seed is one twenty-fifth of an inch long, olive brown or greenish yellow, minutely roughened with mucilaginous glands, oblong, angular, cut off transversely at the scar end, sometimes almost square from compression in the pod, grooves conspicuously darkened.

It flowers from June to frost; seed ripe in August.

It propagates by seed.

It occurs mostly in those areas of the west where moisture is a distinctly limiting factor in crop production and where the soil has a very considerable percentage of sand in its composition. Seldom is it found growing on black humus soil or in the park or forest areas of the west.

It spreads very rapidly, due to its tumbling habit. It is a rapid and vigorous grower, and if at all plentiful will soon choke out a grain crop.

Eradication:

- (a) Disk or skim-plow in the fall immediately after the binder.
- (b) Never allow the plant to mature.
- (c) Harrow when the grain is up three to six inches high. This pulls out many young plants.
- (d) Hand-pull when the mustard is coming into flower.
- (e) Land that is badly infested should be summerfallowed. Keep the summerfallow black until freeze-up.



TUMBLING MUSTARD
(*Sisymbrium altissimum*, L.)

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(f) The following spring after summerfallowing cultivate shallow with a duck-foot cultivator and drill at once, seeding somewhat thickly. Harrow the growing crop once or twice and handpull any stray plants that come up in the crop.

(g) Burn all screenings after fanning and threshing. Mustard seeds are injurious to the health of animals and should be fed very sparingly. Grind finely before feeding to all livestock except sheep.

(h) Burn straw stacks after threshing to prevent stock eating the seed and distributing it over the farm.

(i) Pasturing land, such as summerfallow infested with young plants, with sheep, is recommended. They pack the summerfallow and prevent soil drifting.

(j) Plan a hood crop on areas badly infested, or seed to rape and pasture with sheep.

(k) Seed down to a permanent grass and keep cut or pastured down until the grass takes complete possession of the soil.

(l) Seed to sweet clover and cut for hay or silage when the mustard plants are coming into blossom.

(m) Chemicals. Treatment with iron sulphate solution as for Wild Mustard will destroy the weed.

HARE'S-EAR MUSTARD

(*Conringia orientalis*, L.)

Also called Rabbit's-ear, Hare's-ear, Cabbage, and Klinkweed.

Annual and winter annual. Introduced from Europe. An erect-growing plant, from one to four feet high. Whole plant perfectly smooth, and when young, covered with a fine bloom like that of cabbage. Leaves somewhat fleshy, without teeth, oblong oval, entire, and clasping the stem by two rounded lobes. They resemble in shape a hare's or rabbit's ear. Flowers are a creamy white, about one-quarter of an inch across. Seed pods are square, and three to four inches long.

It flowers in June and July. Seeds ripen during August and September.

It propagates by seed.

The seed is a dark brown in color, one-twelfth of an inch long, granular, roughened. When soaked in water it is covered with short, erect, white, mucilaginous hairs. It resembles in shape the common False Flax.

It occurs quite generally throughout the west, especially in Southern Alberta, in grain fields, on stubble and by roadsides.

It is a coarse-growing weed which occupies much space. The succulent plant absorbs much moisture from the soil, and little grain can grow where there is a patch of it. Its seeds are common in commercial grains.

Eradication:

- (a) Sow clean seed.
- (b) Hand-pull small patches and stray plants when first noticed.
- (c) Harrow the grain once or twice when three to six inches high.
- (d) Disk or skim-plow immediately after harvest. Plow early the following spring, and work the surface. Then allow to stand until about June 1st. By this time all the weed seeds will have germinated. Cultivate well with duck-foot cultivator or rod-weeder, then seed thickly to barley. After barley is harvested, cultivate or skim-plow again, plow or cultivate early in the spring, then seed to wheat or oats. Do not sow too thickly, and seed to timothy or other permanent grass. Leave down to grass for three or four years.
- (e) Summerfallow badly infested areas. Keep the summerfallow clean till freeze-up with cultivation or by pasturing with sheep.



HARE'S-EAR MUSTARD
(*Conringia orientalis*, L.)

- (f) Hoed crop, or sow to rape and pasture with sheep.
- (g) Burn all screenings and stack bottoms, also straw stacks that are badly polluted.
- (h) Keep all roads, fence allowances and waste places clean at all times.
- (i) Mustard seeds should be fed sparingly to livestock and should be ground before feeding to all livestock except sheep.
- (j) Chemicals. Treatment with iron sulphate solution as for Wild Mustard will destroy the weed.

WORM-SEED MUSTARD

(*Erysimum cheiranthoides*, L.)

Also called Treacle Mustard

A native annual and winter annual. Stems erect, simple or branching, six inches to two feet high. Whole plant sometimes slightly hoary, with short, star-like hairs. Leaves dark green, lance-shaped, sparsely toothed. The flowers are bright yellow and one-fifth of an inch across in terminal clusters about one inch across on gradually elongated racemes. Seed pods slightly curved, from one-half to one inch long, obtusely four-angled, erect on spreading foot-stalks. Each pod contains about twenty-five seeds. A full grown plant produces about twenty-five thousand seeds.

The seed is of a reddish-yellow color, about one twenty-fourth of an inch long. Uneven size and shows a furrow on one side. The scar end is darkened. The seeds are very bitter and are not relished by livestock. Sheep will eat them.

It flowers from June to autumn. Seeds ripen from July to frost.

It propagates by seed.

It occurs in waste places and on cultivated land in the west. Quite common in Alberta. Usually found on poorly cultivated fields.

Eradication:

- (a) Sow clean seed.
- (b) Hand-pull and burn when in small patches.
- (c) Disk or skim-plow after the binder.
- (d) The following spring cultivate or plow again when the young plants appear. Seed at once.
- (e) Harrow the growing crop once or twice when it is from three to six inches high. Then hand-pull and burn any remaining plants when they come into flower.
- (f) Fall or spring cultivation followed by clean summerfallow is always very effective. For the summerfallow plow early in June and cultivate when young plants appear or pasture with sheep.
- (g) The following spring, duck-foot cultivate as shallow as possible and seed at once.
- (h) Hoed crop, or seed to rape and pasture with sheep.
- (i) Burn all screenings and stack bottoms, also straw stacks that are badly polluted.
- (j) Keep all roads, fence allowances and waste places clean. They serve as breeding ground for weeds unless they are watched at all times during the growing season.
- (k) Seed down to permanent pastures. Pasture closely until the grass takes complete possession of the soil.
- (l) Chemicals. Treatment with iron sulphate solution as for Wild Mustard will destroy the weed.



WORM-SEED MUSTARD
(*Erysimum cheiranthoides*, L.)



GREEN TANSY MUSTARD
(*Sisymbrium incisum*, Engelm., Var. *filipes*, Gray)

GREEN TANSY MUSTARD

(*Sisymbrium incisum*, Engelm., Var. *filipes*, Gray)

Other English name: Cut-leaved Tansy Mustard.

Native. Biennial. During the first season a rosette of finely divided leaves lying on the ground. Stems, one to four feet, erect, widely branching at the top and bearing a large number of narrow, smooth, slightly curved pods, from one-half to three-quarters of an inch long, on slender, spreading footstalks. Whole plant is a light green. Leaves much divided into five segments. Flowers yellow, one-eighth of an inch across in an elongated raceme.

The seed is small, one twenty-fifth of an inch long, and somewhat oblong in shape.

Time of flowering: June and July; seeds ripen in August.

It propagates entirely by seed.

It is general throughout the Province. There are districts where it is a serious menace, choking out and doing damage to grain crops.

Eradication:

(a) Do not sow crops such as Fall Rye or Fall Wheat, or stubble in seed on ground infested with this weed.

(b) Sow clean seed. Any good fanning mill will remove all seed from cereal grains.

(c) Hand-pull stray plants. Pile and burn when dry.

(d) Waste places where it thrives should be sown to permanent grass and the weed growth kept out until the grass has taken possession of the soil.

(e) Care should be taken to destroy any rosettes which have started late in the fall and that will live through the winter. To do this use a duck-foot cultivator or other broad-shared cultivator. A disk is not satisfactory.

(f) Keep all the edges of fields clean.

(g) Plant a hoed crop on areas badly polluted, or seed to rape and pasture off with sheep.

(h) Disk or skim-plow after the binder to cover the seeds.

(i) Harrow the growing crop when from three to six inches high. It will pull out many of the weeds.

(j) Summerfallow if conditions are bad. Plow 1st of June and keep summerfallow black until freeze-up.

(k) A two-year crop rotation followed by a pasture crop is recommended where summerfallow is not desired.

(l) Chemicals. Treatment with iron sulphate solution as for Wild Mustard will destroy the weed.

Allied Species: Gray or Crowded Tansy Mustard (*Sisymbrium incisum*, *Engelm.*, *Var. Hartwegianum* (*Fourn.*) (*Watson*)). It resembles Green Tansy Mustard very much, excepting that the color is a darker green and the plant is covered with short, grey, downy hairs. It is more erect in habit of growth. The same methods of eradication will be found satisfactory as for Green Tansy Mustard.



RUSSIAN PIGWEED
(*Axyres amaranthoides*, L.)

RUSSIAN PIGWEED

(*Axyres amaranoides*, L.)

Annual, introduced from Europe. A tall, coarse plant, from two to four feet high, erect, widely branching and very leafy. Pale green color. Flowers quite small and pale yellow in color. The plant when mature is of a light golden color. The stems turn almost white.

The seeds are oval, flattened, one-twelfth of an inch long, grey or brown with a silky lustre, surface minutely lined and wrinkled lengthwise, basal scar a short thin groove across the lower end.

It occurs in small patches throughout the Province, along railroads, sides of roads, feeding yards, etc. Several districts report it to be bad in their grain fields, and their hardest weed to control. It propagates by seed.

Eradication:

(a) Keep road allowances, edges of fields, and waste places clean.

(b) Pull, pile in heaps and burn. A single plant will produce as many as twenty-five thousand seeds.

(c) Harrowing the crop two or three times, after it is up three inches, will destroy many plants.

(d) Seed down for four or five years with a permanent grass mixture. The weeds should be kept cut until the grass has taken complete possession of the soil.

(e) Fall cultivation right after harvest will start many seeds which will be destroyed by the frost.

(f) Badly infested fields should be spring cultivated early and then thoroughly summerfallowed and the succeeding crop harrowed several times.

(g) Potatoes, corn, and other hoed or cultivated crops, if kept clean, will do much to rid the soil of the pest.

(h) Sheep eat the young plants readily.

(i) Cutting will not kill the plant. New, fresh shoots will at once come up. Pulling, hoeing, or cultivating out is necessary for its destruction.

(j) Clean up after the threshing machine. Screenings containing seeds of this plant should be fanned to take the seeds out, which should be burnt. There is little feed value in Russian Pigweed seeds, and very few at any time should be fed.

(k) The threshing machine and bundle racks should be thoroughly cleaned out and swept off before moving.

REDROOT or PIGWEED

(*Amaranthus retroflexus, L.*)

Annual of European origin. Erect-growing plant, usually much branched; leaves are ovate in shape and borne on long stalks, each leaf tipped with a bristle. The stems are covered with coarse hairs. The entire plant is light green in color. The long tap-root, however, is a pale pink, hence the name of the weed, "Redroot." Its flowers are green, borne on compound spikes at the axils of the leaves and at the end of the branches. The individual flowers are quite inconspicuous.

It occurs generally over the Province of Alberta, and in many districts is increasing with alarming rapidity. It is a gross feeder, and when growing thickly will greatly reduce the yields of grain.

It flowers during July and August; seeds ripen in August and September.

The seeds are almost black in color, shiny, oval and flattened on both sides.

Eradication:

- (a) Hand-pull stray plants.
- (b) Spud or hoe out stray plants. This is quite effective because when cut below the crown the plant will die.
- (c) Be careful not to sow it in clover or grass seed. It is easily cleaned out of cereal grains.
- (d) Disk after harvest, preferably after the binder. Then plow late that fall.
- (e) Cultivate early in the spring; do it well and reasonably late. Then seed to barley or oats and cut for green feed.
- (f) Keep cut all plants around buildings, fences, etc. If kept cut for three or four consecutive years, very few, if any more, will appear.
- (g) Harrow the growing crop once or twice. This pulls out many young plants.
- (h) Do not grow fall crops such as Fall Rye and Fall Wheat.
- (i) Fall and spring cultivation followed by clean summerfallow will prove effective and be advisable on badly infested areas.
- (j) The life of Redroot seed is from three to five years, therefore any good five-year rotation should get rid of it.
- (k) A hoed crop will do much to rid the soil of this weed. Two to three consecutive hoed crops may be necessary.



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REDROOT OR PIGWEED
(*Amaranthus retroflexus, L.*)



RUSSIAN THISTLE
(*Salsola kali, L.*)

RUSSIAN THISTLE

(*Salsola kali*, L.)

(*Salicornia kali*, L.)

Other English names: Russian Tumbleweed and Russian Cactus.

Annual, introduced from Asia. It is a bushy plant with a prickly appearance, due to the long, thick, threadlike, prickly leaves, and the short, spiny bracts on the flowering branches of the older plants. As the plant matures, it gradually assumes a spherical form, and the branches are marked with red lines. When the plant is ripe it is of reddish-yellow. It is quite green when young. The ripe plants break off early at the base. The flowers are inconspicuous, being small, without petals, and solitary in the axils of the leaves.

The seed is about one-sixteenth of an inch in diameter, cone-shaped, the large end concave with a well-marked protuberance in the center of the cavity.

It flowers from July to September; seeds ripen by August.

This weed propagates by seeds. It breaks off and rolls before the wind, dropping seeds in its path. Owing to its tumbling habits and its preference for dry soil, it is very prevalent in the drier portions of Southern Alberta. It is doubtful if it will ever become a menace on the dark soils of our park and forest areas. On account of its rank growth, it causes serious loss by using up moisture that is required for the development of the grain.

Green young Russian Thistle may be cut and cured for hay. It makes a fairly nutritious feed for livestock.

Eradication:

- (a) Sow clean seed.
- (b) Hand-pull stray plants.
- (c) Harrow the growing crop; it is easily killed when young by this method.
- (d) In cases where spring grain is seeded on land badly infested with weeds, the land should be worked early in the spring, and at intervals until good warm weather is assured; then seed immediately after last cultivation.
- (e) Russian Thistle grows rapidly after the crop is cut, and matures very rapidly. A good plan, therefore, to check the growth is to cultivate immediately after the binder; then plow as soon as possible after the crop is removed.
- (f) Summerfallow is strongly recommended on those areas where the weed is bad. In the drier portions of this Province, summerfallow every other year is practised with good results.
- (g) Fence lines, road allowances, and other waste places, should be kept free from this weed. They are breeding grounds which serve to infect the adjoining fields.

CORN SPURREY

(*Spergula arvensis, L.*)

Other English names: Spurrey, Sandweed and Pickpurse.

Annual, introduced from Europe. Stems curving upward, branching from the base, six to eighteen inches high, almost smooth, slightly hairy above. Leaves narrow and linear, one to two inches long, apparently in a circle around the joints of the stems, but really in two opposite sets of six or eight together, with scale-like, modified leaves between them. Flowers white, opening in sunshine, one-quarter inch across, in terminal forked cymes; the fruit hangs downward.

The seed is dull black, lens-shaped, or round and compressed, with the margin extended into a narrow pale wing. The surface of the seed is somewhat roughened, with small, hairlike formations on them.

It flowers in July; the seeds ripen in July and August.

It propagates by seed. It is becoming more frequent in the park areas of the Province. It is seldom found in Southern Alberta on the prairies. It usually occurs where the top soil is somewhat shallow and the subsoil of a heavy, clay nature.

Eradication:

- (a) Harrow the growing crop in the spring two or three times.
- (b) Be sure to sow clean seed.
- (c) Shallow cultivation of stubble lands will start germination and the young plant can be easily destroyed later.
- (d) Badly infested areas should be summerfallowed by giving a light surface cultivation in the fall or early spring. When the Corn Spurrey plants appear, cultivate off with a narrow-toothed cultivator, or duck-foot cultivator if it will work. As the plants appear, repeat the cultivation. A duck-foot cultivator will usually work after the first cultivation with a narrow-shovel machine. Each cultivation should go a little deeper to bring up more seeds of the plant to the place in the soil where they will germinate. Under no circumstances use a plow when summerfallowing badly polluted areas. The writer has observed farmers who have cultivated as often as six or seven times in the growing season, finally getting down to a depth of from four to five inches. If the season is at all moist, this system of eradication will prove highly effective.



CORN SPURREY
(*Spergula arvensis*, L.)



FALSE FLAX
(*Camelina sativa*, L., Grantz)

H.
MCDERMID
STUDIOS

FALSE FLAX

(*Camelina sativa, L.*)

Other name: Balloon Mustard.

Introduced from Europe; annual and sometimes winter annual. It grows erect from two to three feet high. It branches almost entirely from the upper portion of the stem. The bottom leaves are lance-shaped, and the upper leaves quite sharply arrow-shaped; both upper and lower leaves clasp the stem. The lower leaves, and the lower part of the stalk is downy, while the upper part of the stem is quite smooth. The flowers are numerous, small, and borne in loose clusters. They are rather inconspicuous, and are yellowish-green in color. The pod is pear-shaped, with a small projection from the upper end. Each pod is borne on a slender foot-stalk, curved upward, and containing about ten seeds.

The seed is very oily, and, when ground with cereals, gives the meal a bad flavor. This weed is increasing very rapidly in Alberta. It should be eradicated when noticed.

It flowers from June to August; the seeds ripen from July to September. The seed is about one-twelfth of an inch long, pale yellowish-brown in color, and somewhat resembles a miniature wheat seed.

Eradication:

- (a) Sow clean seed.
- (b) Hand-pull stray plants.
- (c) Avoid winter crops on land polluted with seeds of this weed.
- (d) Disk, or shallow plow, in the spring before seeding.
- (e) Harrow two or three times the growing spring crop.
- (f) Land infested with this weed should always be cultivated after harvest and at intervals until winter sets in. Badly infested areas should receive a thorough summerfallow, with cultivation the previous fall, and continuous cultivation throughout the summer.



LAMB'S QUARTERS

(Chenopodium album, L.)

LAMB'S QUARTERS

(*Chenopodium album, L.*)

Other common name is Pigweed.

Native, annual, and European plant. It grows from one to four feet high, with erect, slender stems, which are grooved and branched. The leaves are pale green in color, coarsely toothed, narrow at the base, and borne on long, slender stocks. Flowers are greenish in color and arranged in compound spikes borne in the axils of the leaves. Individual flowers are inconspicuous.

It is a weed that should receive attention. It is a gross feeder, and is a pest, especially in gardens and garden crops, and in the yards around buildings. It is also a harbor for insects and fungus diseases. It frequently is very bad in grain fields.

It flowers from June to September; seeds ripen from August to November.

The seed is about one-twentieth of an inch in diameter, round, and flattened on one side, and is shiny black in color. It is often found enveloped in a brown or greyish covering.

It is general throughout the Province.

Eradication:

- (a) Hand-pull stray plants, or cut, before they go to seed.
- (b) A well-worked summerfallow every two or three years usually keeps the land fairly free from a serious infestation of this weed.
- (c) Harrow the growing crop after it is up two or three inches. Repeat the harrowing as often as two or three times, until the grain is six inches high.
- (d) Seed down to grass for two or three years.
- (e) Sow clean seed. The seed of Lamb's Quarters is a very common impurity in both grass and cereal seed. Care should be taken not to plant seed with the seeds of Lamb's Quarters.
- (f) Sheep help greatly to control it.



COCKLE BUR
(*Xanthium strumarium, L.*)

COCKLE BUR

(*Xanthium strumarium*, L.)

Native, annual, coarse growing from one to three inches high; considerably branched. Leaves are large, heart-shaped or ovate, and dark green in color. The flowers are borne on different parts of the plant and along branches in clusters. The male flowers are borne above, the female below. The burs are about one inch long, and are thickly covered with strong spines which are curved at the ends. The seed retains its vitality for a number of years. The bur sticks to the hair of livestock, and is especially troublesome to sheep if the burs get into the wool, as it irritates the skin and reduces the value of the wool.

It flowers during July and August; the seed ripens during August and September.

This weed occurs mainly in Southern Alberta, along railways, streams, and has begun to make its appearance in a few cultivated fields.

Eradication:

- (a) Sow clean seed.
- (b) Hand-pull; if not too numerous.
- (c) Keep all waste places and pastures cut with a mower.
- (d) Where whole fields are infested, a thorough summerfallow is recommended.
- (e) In the spring, harrow the grain two or three times after the crop is up.
- (f) After harvest skim-plow shallow, or cultivate with a disk, to get the seed of the plant to germinate that fall or early next spring.



SMALL WALLFLOWER
(*Erysimum parviflorum*, Nutt.)

SMALL WALLFLOWER

(*Erysimum parviflorum*, Nutt.)

A native biennial, growing from six inches to two feet high, stems erect, simple or branching; whole plant hoary, with short, stiff bristles. In color it resembles a Prairie Sage. The flowers are bright yellow, and about one-quarter of an inch in diameter.

The seed pods are borne on short stems, and look somewhat like those of Wormseed Mustard. This plant is sometimes mistaken for a Wormseed Mustard.

It flowers from July to August; the seeds ripen from August to September.

The seed is irregular in shape, and reddish-brown in color.

Eradication:

(a) Cultivate with a disk, or plow very shallow, as soon as possible after the binder.

(b) In cases of badly infested areas, delay seeding in the spring to allow as many seeds as possible to germinate and produce plants which should be cultivated off prior to seeding.

(c) A well-worked summerfallow will usually clean up bad cases.

(d) Hand-pull scattered plants.

N.B.—Generally speaking, the methods adopted for eradication of Mustards will eradicate this weed, which is becoming more prevalent in many districts of this Province.

SHEPHERD'S PURSE

(*Capsella Bursa-pastoris, L.*)

Introduced from Europe. Annual and winter annual. The root leaves form a large rosette which lies close to the ground, and in this stage lives through the winter. It may produce a single stalk from one to six inches high, then producing its seed, or it may send up several branches from one to three feet high. It may be bright green and nearly smooth, or grey from very short compressed hairs. The leaves may be deeply cut, pinnatifid, or without any teeth or division. The stem leaves are for the most part arrow-shaped with two sharp, earlike projections, one on each side of the stem. The flowers are small and white. The only part of the plant which seems to be constant is the seed-pod, which is flat, triangular in shape, one-quarter of an inch long, wedge-shaped at the base, notched at the top with the outer angles rounded. Each pod contains about twenty seeds. An average plant produces over fifty thousand seeds.

The seed is small, one twenty-fourth of an inch long, oblong, reddish brown, the surface dull and punctured. It develops a large amount of mucilage and a covering of rather long but very fine transparent hairs.

It flowers throughout the season. When not actually freezing the plant grows and ripens seeds.

It propagates by seed.

It occurs throughout Alberta in all kinds of soils. Very common in gardens and around buildings. There are districts in the Province where it is considered a very serious weed, choking out crops and being very hard to get out of the soil.

Eradication:

- (a) Never let it go to seed. Around gardens, waste places, etc., keep it cut or hand-pulled before any seed forms.
- (b) Badly infested fields should be thoroughly summerfallowed.
- (c) Disk or skim-plow after harvest. If plants appear, cut them off with a wide-shared cultivator before it freezes up.
- (d) Cultivate early in the spring. Keep cultivated until June 1st and sow heavily to barley or cultivate until June 10th and sow to green feed. In badly infested areas, particularly if the spring is dry, summerfallow the entire season.
- (e) Plant a hoed crop and keep it well cultivated and clean at all times throughout the season.
- (f) Seed down to permanent grasses and keep pastured closely.
- (g) Be certain to sow clean seed.
- (h) Burn all screenings after threshing and fanning.
- (i) Harrow the growing crop once or twice when from three to six inches high. This will pull out small young plants of Shepherd's Purse.



SHEPHERD'S PURSE
(*Capsella Bursa-pastoris*, L.)

STINKWEED

(*Thlaspi arvense, L.*)

Also called Penny Cress and French Weed

Introduced from Eastern Canada. Annual and winter annual of European origin. The plant grows from six inches to two feet high. The plant is erect, with numerous branches arising from the upper part. When young it is a dark green color, changing to a golden yellow, or whitish, at maturity. It has a disagreeable and characteristic odor. One plant will produce from sixteen hundred to fifteen thousand seeds.

It is found in most districts in Alberta, occurring particularly in the older settled parts. It is brought in with feed, seed, hay, machinery, wind, livestock, and settlers' effects.

It flowers from April to late in the fall.

Eradication:

(a) Stray plants should be pulled and immediately burnt. Seeds that are extremely small and green will mature and grow if covered with soil.

(b) Sow clean seed.

(c) Grain, before being fed to livestock, should be fanned to take Stinkweed out. Any good fanning mill, with one operation, provided it is not crowded too fast, will clean all Stinkweed out of cereal grains. There is no feed value in Stinkweed seeds. Never feed unground to livestock except sheep. Manure should be thoroughly rotted before hauling on to the land.

(d) On roadsides and waste places scatter straw and burn or use a weed burner. This is better than mowing, raking and burning, particularly if the plants have set seed. They will then shatter; and many will not be burnt, but be left to produce new plants. Straw can be scattered deep on fairly green plants. Burning will destroy them.

(e) Straw stacks with Stinkweed in them should be burnt or fed on the ground. The livestock should be confined to the field that produced the weeds.

(f) Cultivate after the binder to start germination. A second cultivation may be necessary if the fall is wet; small rosettes are liable to appear and, the weed being a winter annual, these should be cut off. The following spring, surface cultivate; and in about

two weeks plow shallow and harrow down at once. Fall plowing is ill advised for Stinkweed. It is liable to cover too deeply. Small seeds should be lightly covered.

(g) Harrow the grain two or three times when from three to six inches high. Cross harrow at least once.

(h) Fall surface cultivation should be followed by early spring cultivation. The plant is a winter annual, and those that live over winter need to be destroyed not later than April. Plow for summerfallow by June 1st. Harrow after the plow, and with the use of a duck-foot cultivator, spring-tooth harrow or rod-weeder, keep the summerfallow black till freeze-up. Keep going a little deeper with each cultivation to bring up more seeds to be germinated. Pull all plants that the cultivator fails to get and burn them at once. Do not leave them lying around.

(i) Surface cultivate early in the spring and repeat as often as necessary to prevent the plants from forming seed pods. Plow on June 1st and harrow down at once. Keep black until July 15th to August 1st, and sow to fall rye and pasture that fall and next spring. Pull and burn any Stinkweed plants that the stock have missed and which have developed to the flower stage. Then plow about June 1st and keep well cultivated and seed again to rye for pasture in the fall and early spring. The rye later can be harvested. After harvest, plow and keep black the rest of the fall. The land will be in good shape for wheat or oats next spring.

(j) When plowing land with Stinkweed on it, be sure to cover every plant completely. As a matter of fact, this applies in case of all weeds. Careless or poor plowing, leaving weeds sticking up here and there, is bad practice. Many of these weeds will continue to mature instead of being rotted and incorporated into the ground. Plow before any seed pods have appeared.

(k) Too often do we find farmers allowing Stinkweed to grow and form pods. Then they plow these plants under. This is simply storing up more trouble, as, no matter how small the seed may be, it will mature and produce a new stand when plowed under. In cases such as this, scatter plenty of straw on the plants and burn. This will destroy the germinating power of any seeds that have set. The weed burner also does excellent work on such areas.

(l) On land that has been well worked all spring, seed to green feed about July 1st, and cut before any Stinkweed pods are produced. Barley can be seeded heavily about June 15th; and if harrowed once or twice when high enough, may mature a clean crop. At any rate, it can be cut for green feed.

(m) On the prairies many farmers cultivate in the fall with the disk, then cultivate again in the spring, and summerfallow in June for the rest of the season. They do this every alternate year. Harrowing the growing crop is considered good business. In this way land badly infested with Stinkweed is in a few years cleaned up.

(n) Spring cultivation, followed by a hoed or cultivated crop, is almost as effective as summerfallow.

(o) Badly infested areas should be put into grass such as Timothy, Brome, and Western Rye, or any recommended grass and clover mixture. To do this, fall cultivate and plow early in spring,



STINKWEED
(*Thlaspi arvense*, L.)

and seed rather thinly to oats, which should be harrowed a couple of times when high enough. Then harrow in the grass seed. Or, during the spring after summerfallow, do further cultivation until well into May and then seed to oats and grasses as above. Cut the resultant crop for green feed if any plants of Stinkweed are apt to set seed. The hay, the next year, should be cut two or three times if possible. The following year pasture, and be constantly on the look out for any plants that the stock have missed, and as soon as they come into flower, pull and burn them. The hay crops of succeeding years should be clean. Leave down to grass for at least five years. Seeding down is very largely a control measure. While a large number of Stinkweed seeds will be destroyed in one way or another under the five-year period, when the sod is broken more plants of Stinkweed will, in all probability, show up.



WILD PEPPER GRASS
(*Lepidium apetalum*, Willd.)

WILD PEPPER GRASS

(*Lepidium apetalum*, Willd.)

Native, annual and winter annual. It grows from six inches to two feet high. The stem usually has many branches. The lower leaves terminate in a large lobe with small lateral ones, and with edges lightly cut in along the margin. The upper leaves are tapering. The plant is greyish in color, and is covered with short hairs. The young plant, which starts in the fall first, appears as a rosette of dark green leaves. As the plant matures, these leaves drop off. The flowers are small and white, with slender, spreading flower stocks.

The seed pods are small, about one-tenth of an inch wide, heart-shaped, notched at the top, and, at maturity separate into halves.

This plant is becoming more troublesome from year to year throughout the grain fields of Alberta. It has a bad effect as an impurity upon the sale of timothy and clover grown for seed.

It flowers in June and July; the seeds ripen early in July and during August.

Eradication:

(a) The same method of eradication defined for Stinkweed in this Bulletin will prove effective in the elimination of this weed.



YELLOW WHITLOW GRASS

(*Draba nemorosa, L.*)

YELLOW WHITLOW GRASS

(*Draba nemorosa, L.*)

Native, annual and winter annual, growing from six to twelve inches high. The whole plant is slightly downy, and branches below. The leaves are stockless, lance-shaped, slightly toothed. Flowers are of a whitish-yellow color. The pods are elliptical-oblong, one-half the length of the foot-stocks, which are almost horizontal at maturity.

This weed is becoming troublesome in only a few places in the Province, and on quite small areas. It, however, should be kept in check.

It flowers in June and July; the seeds ripen in July and August.

The seed is small, one-sixteenth of an inch long, egg-shaped, flattened, and reddish-brown in color.

It occurs mainly in stubble fields more or less throughout the Province.

Eradication:

(a) Cultivate with a disk, or plow very shallow, as soon as possible after the binder.

(b) In cases of badly infested areas, delay seeding in the spring to allow as many seeds as possible to germinate and produce plants which should be cultivated off prior to seeding.

(c) Plow the summerfallow early, so that the plant will be destroyed before going to seed. Cultivate at frequent intervals throughout the summerfallow period. On land that drifts when worked to any great extent during the summerfallow year, sheep put on the summerfallow will keep this weed well under control; they also will keep it down on waste places.

BLUE BUR or STICKSEED

(*Lappula echinata*, Gilbert)

Other English names: Blue Bur, Stickseed, Sheep Bur and Stickweed.

Introduced from Europe, annual and winter annual, growing erect, branching, whole plant covered with short, white hairs. Both the stems and leaves are linear-oblong; root leaves about three inches long, narrow at the base; stem leaves stalkless. Flowers are small, about one-eighth of an inch across, pale blue in color, erect, arranged in long, somewhat one-sided clusters.

In areas of the Province where stubbling-in is practised to any great extent, this weed has become a serious pest. It has a peculiar odor; stock refuse to eat it. The bur of this weed is very troublesome to sheep, on account of the fleeces becoming matted with it.

It flowers from June to August; seeds ripen, July to September.

The seed is about one-eighth of an inch long, dark brown, pear-shaped, with a rough surface; margin covered with hooked spines.

This plant propagates by seeds.

It occurs by roadsides, in waste places, in corrals, and around buildings, as well as in stubble fields that should be summerfallowed.

Eradication:

- (a) Sow clean seed.
- (b) Hand-pull stray plants.
- (c) Badly infested areas should be summerfallowed.
- (d) Grain should not be sown on stubble land that is in any way infested with this weed.
- (e) Cultivate land immediately after harvest, or skim-plowing it will give good results.
- (f) Delay seeding as long as possible in the spring, and cut off with a wide-sheared cultivator all plants which appear. Seed immediately after the last cultivation.
- (g) Close cutting when in early bloom will prevent it from seeding, and, if continued from year to year it will ultimately be suppressed in pastures and waste places.



BLUE BUR OR STICKSEED
(*Lappula echinata*, Gilbert)



SPEAR LEAF GOOSEFOOT
(*Monolepsis chenopodioides*, Moq.)

SPEAR LEAF GOOSEFOOT

(*Monolepsis chenopodioides*, Moq.)

A native, annual, with low, spreading habits of growth. The whole plant is dark green in color, resembling Lamb's Quarters to some extent. The leaves are spear-shaped, and fleshy. The flowers are borne in the axils of the leaves and are quite inconspicuous.

It occurs throughout the Province, along roadsides, in waste places, and in gardens. It also appears in stubble fields that need cleaning up by summerfallow, or other means.

Eradication:

- (a) Cut with a hoe before the plants go to seed.
- (b) When found in grain fields, the usual methods advised for the destruction of annuals will hold it in check.



COW COCKLE
(*Saponaria Vaccaria, L.*)

COW COCKLE

(*Saponaria Vaccaria, L.*)

Annual, introduced from Europe. It grows from one to three feet high; stems erect, branched above, and much branched from the base. The entire plant is smooth, succulent, and of a grayish-green appearance. The flowers are pink, about half an inch in diameter; calyx ovate, inflated, and finely ribbed. The flowers are succeeded by smooth, rounded capsules, containing about twenty seeds.

This weed is becoming more general in the Province, particularly in wheat-growing districts. It is a vigorous grower, and robs the crop of moisture, as well as crowding out the grain.

It flowers in July; seeds ripen in August.

The seed is about one-twelfth of an inch in diameter, round, finely pitted, and a dull black in color. The seed looks somewhat like the seed of Wild Vetch.

Eradication:

- (a) Sow clean seed.
- (b) Hand-pull stray plants.
- (c) Fall and spring cultivation will aid greatly in holding it in check.
- (d) Seed down to grass, such as Timothy, Brome, or Western Rye, for a period of from three to four years. This greatly reduces the number of plants.
- (e) Harrow the growing crop several times to kill the seedling plants.
- (f) A clean summerfallow is also effective.



WILD RADISH
(*Raphanus Raphanistrum, L.*)

WILD RADISH

(*Raphanus Raphanistrum, L.*)

Introduced from Europe, annual and winter annual. It grows from one to three feet high. It is often confused with Wild Mustard. It has a yellow flower with purplish veins on the petals. The flowers are fewer and larger, and somewhat paler than those of Wild Mustard. The seed pods are composed of two joints, and have no valves; the lower pods are small, seedless, and remain attached to the foot stocks. The upper ones contain several one-seed cells. The branches starting near the base of the plant are few; the leaves are deeply lobed, and of a pale green color. The leaves and stocks are covered with short, stiff bristles.

It flowers from July to September; its seeds ripen in August and September.

The seed is about one-tenth of an inch long, and varies much in size and shape. It is usually oval, slightly flattened, and is a light reddish-brown color.

Its occurrence is becoming from year to year more frequent in many districts of this Province.

Eradication:

- (a) Hand-pull stray plants.
- (b) Cultivate in the fall; the coming spring work well and late, until the soil is warm enough to produce a vigorous growth. Cultivate, and seed thickly to barley. Harrow a couple of times after the crop is up, and cut for green feed. The next year seed to oats, with timothy or other grasses, and pasture for two or three years. If hay is cut, cut it early before any plants mature other seeds.
- (c) Sheep like the young plants of this weed, and will frequently keep it from producing seed.
- (d) Spray this weed with chemicals as in the case of Wild Oats.
- (e) Any well-worked summerfallow is the surest method of cultivation to eradicate this weed. The method of summerfallow as recommended for the eradication of Wild Mustard, or Wild Oats, would be effective in destroying this weed.

WILD RADISH

(Raphanus Raphanistrum)

NOTICE

Those wishing information on weeds not specifically dealt with in this bulletin should communicate with one of the following: The Field Crops Branch, Department of Agriculture, Edmonton; the Agronomist at the nearest Provincial School of Agriculture; the Field Supervisor; or the Local Weed Inspector.

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